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Rådhuspladsen, KBM 3827

Cultural Historical Report, Metro Cityring Excavation

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Foreword

As a result of the extensive archaeological excavation work carried out as part of the "Metro Cityring" project, a vast amount of new knowledge has been brought to light. Previously unseen structures and concise dating of the earliest part of the city's history have provided archaeologists with very important material to improve our understanding of in particular the early urban development of the city.

Before the Metro excavations at the present day Town Hall Square (Rådhuspladsen) this area was thought to have been an open and uninhabited zone that was not incorporated in the true city area until a defence was established, and at some point in the 13th century turned this into a defended border zone between the city and its hinterland.

This, however, has now turned out to be largely incorrect. The existence of an early cemetery (11th–12th cent.), storage and waste pits, the remains of workshops or houses and indications of intensive iron working revealed below the present day square have changed our ideas about the site radically. Instead this part of the city must now be interpreted as an early activity area, perhaps even under the benefaction of a magnate as indicated by the early cemetery. A completely new picture of this area – and of the early development of Copenhagen in general – can be envisaged.

Of the other important discoveries worthy of mention are the surprisingly late date of the first city gate (Vesterport), which it now appears was not established before the second half of the 14th century – perhaps a century later than thought previously – and the fact that the chronological sequence and extension of the medieval and Renaissance city defence in this area have now been established. As well as this the excavation has brought to light a vast amount of interesting and unique finds that allow us to understand the early urban life of Copenhagen in far more detail than ever before.

In this cultural historical report the archaeologists describe the most important discoveries from Rådhuspladsen and give an overview of the results and new interpretations. For those who wish to read more, a comprehensive technical report of the excavation results is available in the museum archives and online.

It is hoped that the report will be read widely and that the results will make the reader reflect upon Copenhagen's rich past and the development of the city's urban way of life from its very beginning in the 11th–12th century and up to the present day.

Thomas Roland, Archaeological Leader, Museum of Copenhagen

Contents

Introduction

An archaeological excavation was conducted at Rådhuspladsen, Copenhagen (KBM 3827) by the Museum of Copenhagen in 2011-2012. The excavation was undertaken in advance of the new Metro Cityring Project, which will provide a new transportation system in the city centre of Copenhagen and to the surrounding suburbs of the city; the developer was Metroselskabet I/S. Where new Metro stations were to be constructed over archaeological material, excavations were undertaken in accordance with the Consolidated Act on Museums (see below). The Museum of Copenhagen (KBM) is responsible for the archaeological work carried out in the Copenhagen and Frederiksberg municipalities, and hence conducted the archaeological work on this project.

It was known in advance that archaeological material would be encountered at Rådhuspladsen in significant quantities, based on historical and cartographic information and on previous archaeological observations made in the area. It was expected that part of the former city moat/moats from the medieval and post-medieval period would be seen, as well as elements of associated gates, and elements of a watermill. During the main phase of work at Rådhuspladsen (from January 2011 to August 2012), it was estimated that a total of 2.662 m^3 of soil would be archaeologically excavated. A further 2.211 m^3 was to be observed and documented to a lesser degree in watching-brief conditions. The post-excavation work, analysis of the data, specialist work and report writing was conducted over the following three years, and was completed in September 2015.

The archaeological remains encountered at Rådhuspladsen exceeded expectation, with an immense amount of material surviving, spanning a period from as early as c. 1000 A.D. up to the 20th century. As well as the anticipated features outlined above, significant unexpected pre-fortification remains were seen, suggestive of urban activity in the area from as early as the early medieval period. Furthermore, an unexpected discovery was made when part of a burial area was encountered in a trench at the edge of H.C. Andersen's Boulevard. There is no known historical documentation of this cemetery, and it was not encountered archaeologically before. Scientific dating suggests that the cemetery was in use in about the 11th century.

Rådhuspladsen became a square in the 19th century with the levelling of the fortifications in this area, and was chosen to be the location for the new townhall (Rådhus). Hence it is to this day the centre of administration for the city of Copenhagen. In the Middle Ages it was the location of the western boundary of the city, the moat and ramparts – in different forms, scales and precise placement. The city's westernmost street, Vester Voldgade, ran along the inside of the fortifications, and along the eastern edge of present day Rådhuspladsen. Many of the street and district names to this day tell us something about the former shape of the city; Vestergade (Western Street), Vester Voldgade (Western Rampart Street) and Vesterbro (Western Bridge).

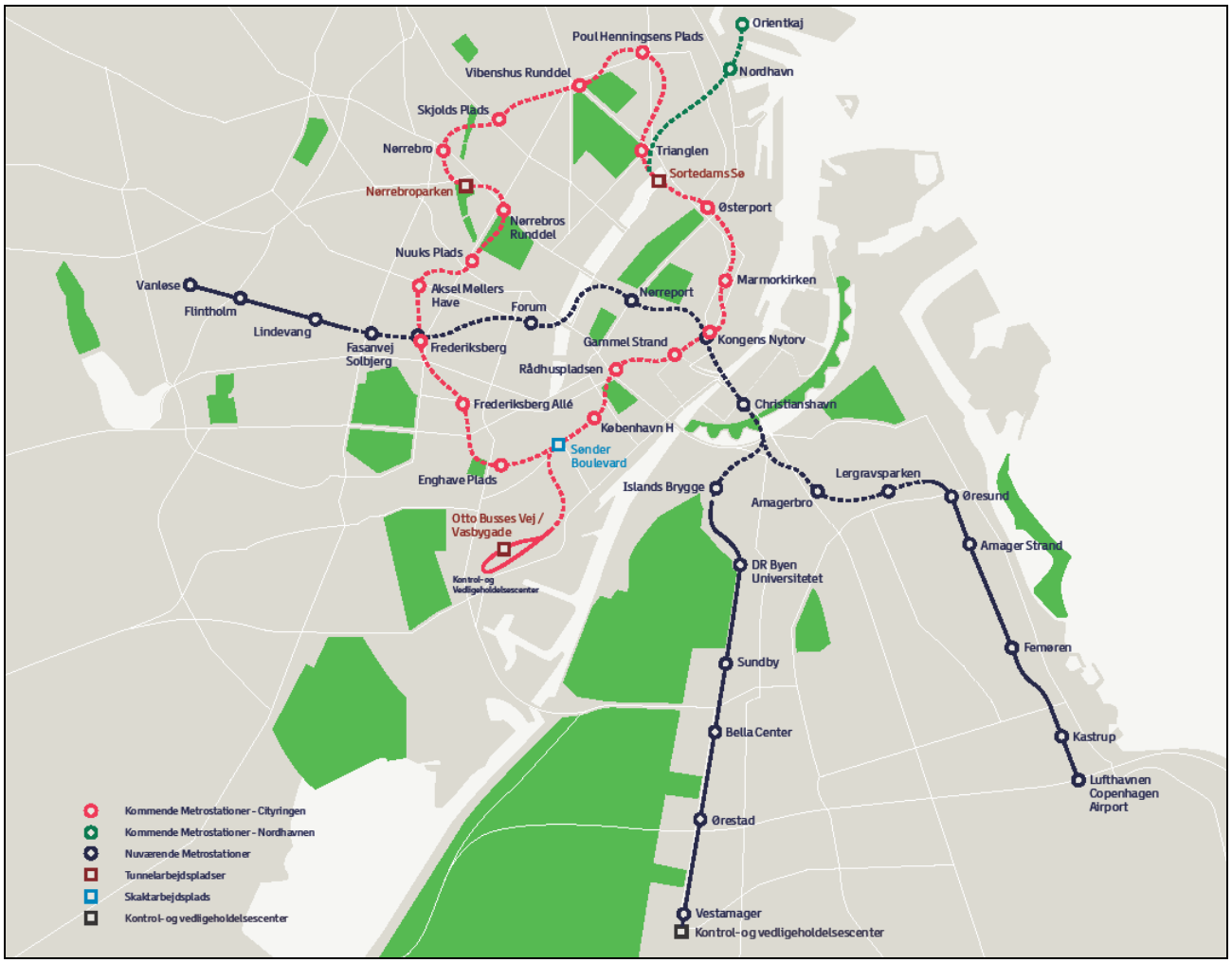


Figure 1 Central Copenhagen showing the Cityring with stations and its connection to the existing Metro. Map by Metroselskabet I/S.

Rådhuspladsen is therefore a border area, formerly separating the western part of the city from its hinterland, and now dividing the inner city area from its western suburb. The area has seen significant changes over the years, with various structures placed on and around the square at different times; the new Metro station is just the most recent significant change to occur, and will become a new feature of the Rådhuspladsen landscape.

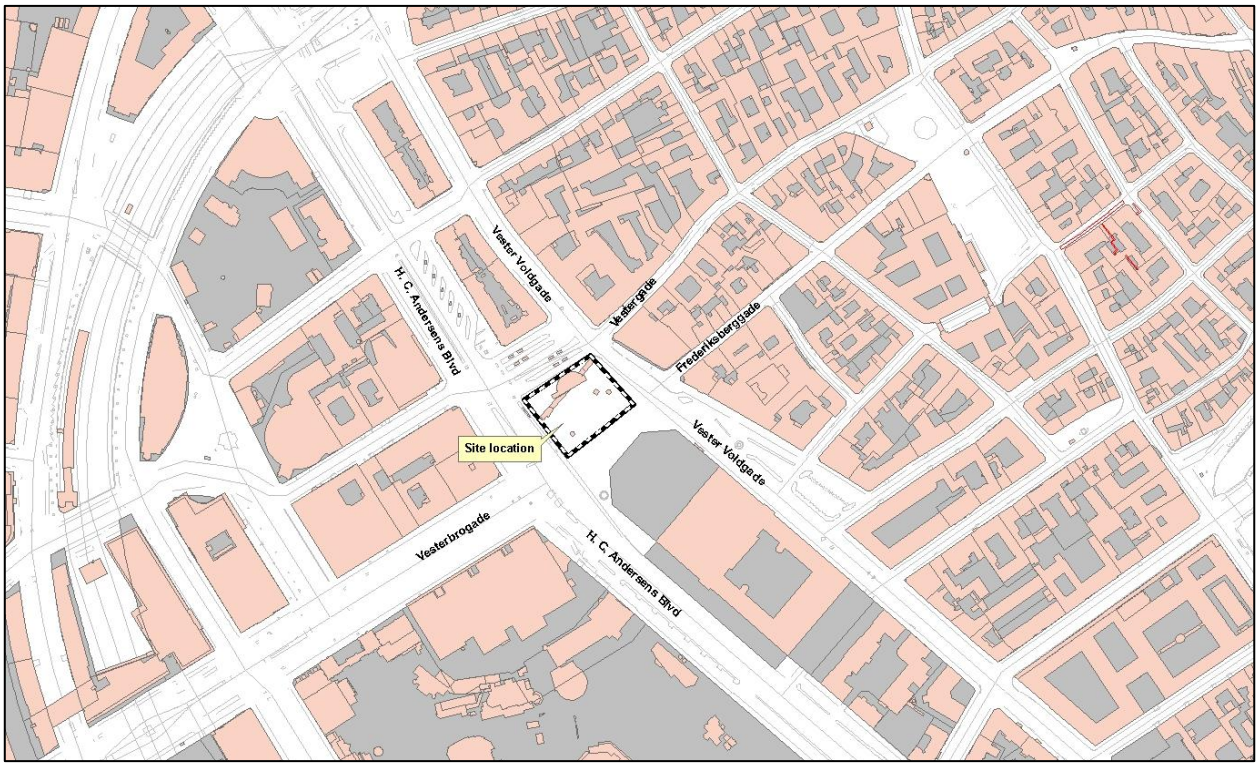
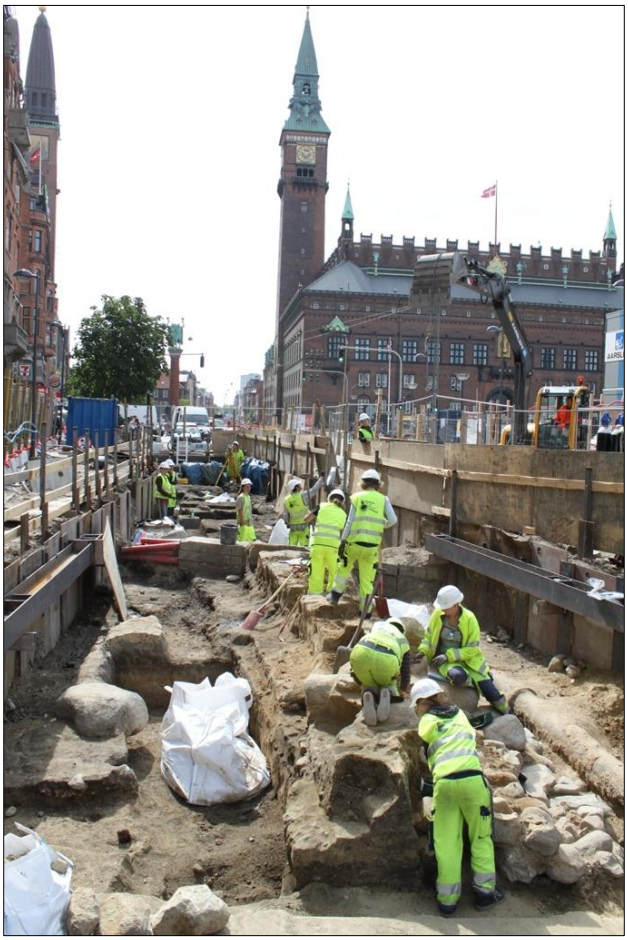


Figure 2 Location of development area with adjoining streets shown



A full excavation report has been produced (Lyne & Dahlström 2015), which conforms to specific Kulturstyrelsen guidelines. No research was carried out on the results for the purpose of the report; it is rather a working statement of the results and conclusions. Full analysis and interpretation of the results will rely on future and ongoing academic projects. The purpose of this report is to place the results of the excavation in a broader cultural historical context – within the wider frame of the historical development of Copenhagen, and to do so in a user-friendly format accessible to the general public. The report (Section I) was written by Hanna Dahlström (Phase 1 and 2) and Ed Lyne (Phases 3-7), while in Section II, Hanna Dahlström wrote about the emerging medieval town, and the remainder was written by Ed Lyne, except for 'Urban waste as a source of information', by Ed Lyne and Camilla Haarby Hansen.

Figure 3 Rådhuspladsen during excavation in 2011

Section I – Chronological Development

Introduction to the Chronological Development

The results of the excavation at Rådhuspladsen are very significant in scale and in importance, contributing greatly to our knowledge of the earliest years of the western part of the fledgling town, as well as the subsequent development of the city and its defences in that area. The results will be discussed in the following section in chronological order, commencing with the early medieval remains and concluding with the documented modern structures. The archaeology has been divided into phases in order to structure the activity into logical time related sections within the report. These phases have been discussed together as appropriate. The phases are:

Phase 1: 1050 – 1250 (sub-divided into 1050 – 1150 and 1150 – 1250)
Phase 2: 1250 - 1370
Phase 3: 1370 - 1500
Phase 4: 1500 - 1600
Phase 5: 1600 - 1670
Phase 6: 1670 - 1860
Phase 7: 1860 – present day

The archaeological remains at Rådhuspladsen had been impacted to quite a high degree by various acts of construction down the years, and indeed in many cases had been impacted by subsequent archaeological activity, such as the construction of the moats. This meant that the archaeological features were often partial, and sometimes quite difficult to interpret. Nonetheless, using the single context excavation system in tandem with the use of sections where appropriate, and aided by C14 dating, dendrochronological dating, and artefactual typology, it has been possible in most cases to establish the order of events and gain a good picture of what has gone on in this area down the centuries.

In general the sterile underlying clay, where it had not been disturbed, was encountered at a depth of c. 1 - 1.25 m below present ground level, with archaeological layers overlying this where they survived. However, many of the archaeological features were cut into the underlying clay, and in many cases this was to a substantial depth. The wells and pits had frequently been dug 2 m or more into the underlying clay, while the very substantial moat cuts had been dug as much as 5 m deep into the sterile post-glacial clay.

The excavation was carried out across a number of different areas (1 – 5) and smaller trenches (see Figure 4). These areas will be referred to in the following chronological account of the site as appropriate. In order to aid the interpretation of the site, different features have been assigned unique IDs or Group numbers by the archaeologists. The use of these labels is kept to a minimum in this public report, but where multiple similar features are discussed, such as pits, the group number has been used in order to help the reader to distinguish between the various examples.

Figure 4 Area plan, showing Areas 1 to 4, and main watching briefs Area 5 and Z 77745

Table 1 Main structures and their dating

Structure	**Construction Date**	**Dating evidence**	**Comments**
Cemetery	11th/12th century	C14, C13, stratigraphy, artefacts	
Various medieval structures, buildings	11th to 14th centuries	C14, artefacts, stratigraphy	
Pits, wells	11th to 14th centuries	C14, artefacts, stratigraphy	Some of these probably superseded each other.
Roadway	c. 12th/13thcentury	Stratigraphy, artefacts, C14	Long period of use makes dating broad
Medieval Moat	c. 1372	Dendro (from bridge)	Potentially older
Bridge 1	c. 1372	Dendro	
Medieval Gate	c. 1372	Dendro (from bridge) + stratigraphy/finds	Foundation cut through 13th century layers

Rampart	c. 1372	Association with other features/stratigraphy	
Bridge 2	c. 1438	Dendro	Replacement of bridge 1
Bridge 3	c. 1500	Dendro (from construction)	Replacement of bridge 2
Moat revetments	c. 1500	Dendro	Structure was replaced in parts on a number of occasions
Demi-lune	c. 1530	Dendro (from stakes in ditch)	Secondary moat outside medieval gate
Outer Gate and bridge	c. 1580	Stratigraphy, cartography	Approximate dating
Outer moat	c. 1580	Association with outer gate, cartography	Approximate dating
Bastion wall	c. 1590 - 1620	Cartography, association with outer moat	Approximate dating
Mill, mill race	c. 1607	Dendro	Many consistent dates retrieved
Third fortification	c. 1668	Cartography	
Gatehouse	c. 1677	Dendro	

Phase 1 Early urban development – A.D. 1050-1250

Main structures: Burials, road, building remains, pits

Introduction to Phase 1

Prior to the commencement of fieldwork, expectations for surviving medieval remains at Rådhuspladsen were relatively low. This was partly due to the location of the excavation area, lying mainly outside of the medieval town (as previously thought); and also due to the area being heavily used in modern times for service trenches, the placement of infrastructure, air raid shelters, and the large underground public toilet built in 1941. All of these factors were expected to have had a negative influence on the preservation of archaeological remains. Contrary to expectations however, a substantial amount of medieval archaeology survived, contributing important new information regarding the early development of the city. As a result, the Rådhuspladsen excavation can be considered to be the single most important site to date in Copenhagen when it comes to information about life and activities in the medieval time period.

The earliest evidence uncovered was of a cemetery and dispersed settlement dating to the latter half of the 11th century. The oldest archeological features were a group of graves located along the eastern edge of present day HC Andersen's Blvd, some refuse or storage pits and fragmentary building remains, probably belonging to a number of different households. Already from this early stage of the site, traces of iron-smithing were identified in the form of slag, hammer scales and furnace fragments found in refuse pits. There was also infrastructural evidence, such as the partial remains of a road. Scientific dates in the form of C14 AMS (see below) show activity in the 11th century in the form of a number of graves, pits and postholes, while typological evidence further suggests early medieval activity, primarily in the form of combs and pottery (Baltic ware and Early greyware) retrieved.

C14 AMS (Accelerator Mass Spectrometry) dating, also known as radiocarbon dating is a method for determining the age of an object containing organic material by measuring the amount of the radioactive carbon 14 isotope remaining in organic material. This isotope decays at a known rate, meaning that the age of a given material can be ascertained, within levels of certainty described in percentages.

Sometime early in the 12th century the activity in the area intensified. The area was reorganized, with new buildings constructed, new road layers laid and many storage and refuse pits dug, connected to occupation and craft work. The cemetery however was abandoned early in the 12th century. In the 13th and 14th century the area was still used for settlement and craft, such as iron-smithing. The placement of the different features suggests that the focus for activities had shifted toward the east. Building remains reveal houses with several usage phases within the high medieval period. Only sporadic traces of settlement are seen in the western parts of Rådhuspladsen from this period. Activity in the area almost completely stops during the high medieval period. This seems to coincide with the building of the fortification along the town's western edge, which was dated to c. A.D. 1371 by dendrochronological analysis of construction elements from the oldest bridge over the moat (see next chapter).

Phase 1 Description

The earliest evidence – c. A.D. 1050-1150

Across the area at Rådhuspladsen glimpses were seen in several locations of the original topsoil. This can be seen on Figure 5. It was seen in the form of homogenous brown soil overlying the natural geological clay. It was preserved in fragments between the many cuts for moat, pits, wells, postholes or more modern cuts such as for service trenches or air raid shelters. This was not a cultural layer in itself; it was not deposited as a result of human actions, but rather was the ground surface at the time of the earliest settlement on site. It was therefore affected by human activity at the time. Inclusions such as small pieces of charcoal, burnt clay, lime, pebbles etc, as well as artefacts, are likely to have ended up on the ground surface as a result of casual human activity, such as trampling, the throwing out of refuse, or simply by dropping items. This can provide information on how intensely the area was used for example, and if there were buildings or other specific activities close by.

The original topsoil level at Rådhuspladsen shows that activities were taking place, but apart from the western areas it does not seem to have been very intense. In most areas of the site there were small fragments of charcoal and burnt clay but few finds. In the western parts, especially in the southern part of the cemetery and even further south, there was much charcoal flecking and small slag fragments, suggesting that there was iron-smithing going on in the vicinity. This was true also for some of the grave fills in the cemetery, where also some pottery sherds of Baltic Ware and Early Greyware were found.

Other general information on the kind of environment Rådhuspladsen was at this time comes from macro-environmental analyses. The analyses (based mainly on samples taken from fills of pits) show a variety of plant species were present, i.e. dry-to-fresh and nitrogen-preferring ruderals (weeds) like goosefoot, reflecting a growing aspect of vegetation. This indicates an environment which is characterized by quite open areas and the presence of cultivated plants. In short, it is what we might expect from an extensively used area which was recently been taken into use.

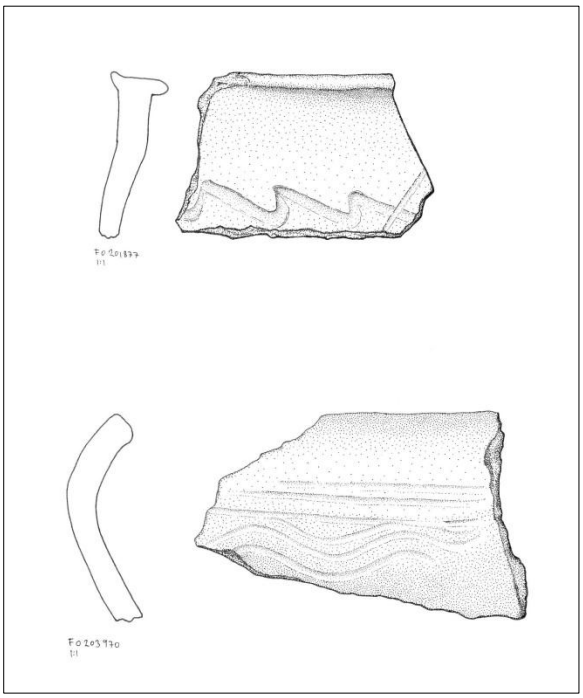


Figure 4.1 Baltic Ware rim sherds from Rådhuspladsen (drawn by K Kam Tayanin)

Figure 5 Plan of features from the earliest phase – c. 1050-1150. Postholes and pits are black, cultural deposits, including old topsoil, are marked in grey. The large, irregular shape in the middle of the picture represents the remains of the road leading into town, whose oldest phase can be placed in the period before A.D. 1150

Many of the earliest dates were retrieved from features in the western part of Rådhuspladsen. Radiocarbon dates from graves and ditches as well as typological dates from pottery and combs strongly indicate that this area was in use during the latter part of the 11th century. The character of the original topsoil as described above, is another indication of early activities, and maybe also points to more intense usage of this part of Rådhuspladsen, compared to the middle and eastern parts. The most important features from this period are without a doubt the burials encountered along the eastern edge of HC Andersens Boulevard. This burial ground is not mentioned in historical sources about Copenhagen and had never been encountered by archaeologists before. They represent the remains of some of the earliest inhabitants in Copenhagen and can as such add information on living conditions and social organisation in the earliest town.

In one of the narrow watching brief trenches where new services were to be placed, a group of Christian-type burials were identified. They were exposed not very deep down under the pavement, only c. 0,8 m below present day ground level. Due to the narrow nature of the trench and the fact that service trenches had been dug through this area previously, not many graves were complete. However, fragmented remains of ten individuals were found *in situ* in their graves, and in addition to those, disarticulated human bones

from a further 11 individuals were collected (some from grave fills), suggesting that other burials had been disturbed – either during the cemetery's usage period or in modern times.

Figure 6 Graves (brown) and presumed border ditch (light blue) of the cemetery. The line in the lower right part of the picture marks the estimated edge of the road leading into the town area

Early medieval pottery found in the grave fills, as well as the fact that no written records exist of burials in this area, suggested that these graves were early medieval. AMS C14-dates were taken from bones from all individuals and the results, as expected, turned out to be very early. The dates span from late 10th century to late 12th century – however, when it comes to dating human bones a special calibration of the results has

to be made, due to the fact that depending on the type of diet people had, the material in the bones is affected in different ways, resulting in the analyses potentially giving older dates than they should. After this calibration is applied, the usage phase of the cemetery is placed between c. A.D. 1080 and 1130, if it were presumed that the graves were contemporary. We know that they were not contemporary however, due to the fact that some have definitely disturbed older graves. This means that the interpretation of the results needs to be further worked upon, and that it is likely that the usage phase needs to be extended somewhat. A period of c. A.D. 1050-1150 seems probable, based on the available evidence.

The skeletal material has undergone basic osteological analysis at the University of Copenhagen. Basic osteological analysis can show age, sex and stature of the individuals, as well as trauma and diseases which are visible in the bones. In that way we can gain valuable information about the life and death of the people that were buried here, and who most likely lived here. Due to the high degree of fragmentation, only a limited amount of information could be extracted from the analysis. It was clear however that the buried individuals represented women, men and children and all age groups. The common pathology of gout, periodontitis and caries were found but otherwise nothing that was unexpected. The height of two individuals could be assessed, of one man and one woman. They were respectively 179 cm and 170 cm tall. Compared to the average height of people from this time period, these individuals were unusually tall, especially seen in comparison with individuals buried in the neighbouring cemetery of St Clemens, immediately east of Rådhuspladsen which would have lived around the same time. The women who were buried at the St Clemens cemetery in the early medieval period were small, some with heights of 140-145 cm, and some men were 162-165 cm tall. Of course, no statistically valid information can come from just two individuals, but it is an interesting anomaly, which warrants further study. It is possible that the people buried in the different cemeteries had different diets, health or other living conditions due to their social or cultural affiliations, or perhaps the differences could even suggest that they had different ethnic backgrounds. Or could the differences be one of chronology, since the exact time period of the earliest usage of the St Clemens cemetery compared to the burial ground at Rådhuspladsen is not settled yet?

The graves were placed at an even distance to each other, but the small area exposed meant it was difficult to establish if they hade been placed in rows or in some other spatial system. Other excavations of medieval cemeteries have shown that after a cemetery has been used for a long time, it is very difficult to see patterns in how the graves were spatially laid out. The spatial distribution of the graves at Rådhuspladsen seems to indicate that they represented the outer parts of a larger burial area. The distance between the graves became less towards the north, and some graves were inter-cutting older graves. Towards the south the distance between graves was greater. To the south there was also a feature which can be interpreted as a fragment of a ditch, running east-west, which may have functioned as a border to the cemetery. Immediately south of the ditch the presumed route of the early medieval road leading east-west through the area, as seen further to the east (see later in this chapter), is thought to have been situated.

The size of the cemetery is not known, nor is it known if there was a church connected to it. No earlier evidence for a church or cemetery in this area has been seen, neither in the written sources nor in the archaeological record. Of interest in this regard however was the discovery of human leg bones made in a small trench situated c. 20 m northeast of the burials. This trench was c. 0,5 x 0,5 m in plan and c. 1,5 m deep. The small area of access made documentation difficult, so no observations of any features possibly

connected to the bones were found. Two lower leg bones (tibia) were recovered, which according to the osteologist could have belonged to the same individual. Also of interest was a reference found in the museum archive from the 1950s, which referred to the discovery in the 1950's of human bones outside of Helmershus, the building facing the north side of the square. Police were called to the scene to investigate if the bones were modern and if so if there were possible evidence of a crime. No further information was found in the museum archive, and an inquiry at the police archive proved that it had not turned into a criminal case. This suggests that the burials found during the excavation in 2011-12 were possibly part of a considerably larger cemetery located here in the early medieval period. Further discussion of what the discovery of the cemetery means for our understanding of the early town of Copenhagen can be found in Section II of this report.

Apart from the cemetery, there were also traces of settlement and craft in the western part of the excavation area. South and southeast of the cemetery there were a number of pits, wells and some postholes, with large modern truncations impacting the level of preservation. In general there were not as many archaeological features in this part of the site as in the other areas, which could be a combination of both poorer preservation conditions and less intense usage of this area. The undisturbed areas with preserved early medieval features were quite small, so the material was rather fragmentary. Despite this, the fact that some features were intercutting suggests relatively intense usage of the area at least for a time.

Although fragmentary, it was possible to discern a number of phases during the medieval period. All phases showed evidence for combined occupation and craft activities. Some pits clearly were very early, while some were from the high medieval period, and there was also a group of undated features which should be seen as belonging within this period. The usage of the area does not seem to change overall during the early and high medieval period. All features from within this time period in the western part of the square will therefore be presented here.

Figure 7 Pits and wells in the eastern part of Rådhuspladsen

In general, the pits in the western area were not as deep as in other areas, which could be a result of ground level having been reduced across this area at some point, hence removing the upper part of the pits. It could also be that the activities in this part of the excavation area were somewhat different from elsewhere, indicating that production activity was dominating (although not the only activity) in the western area. With a few exceptions, the finds in this part of the excavation area were - relatively speaking - dominated by slag and iron working residue, with lesser amounts of animal bones and other household waste. This could be indicative of a relative dominance of production related activities.

In an activity layer close to the possible border ditch of the cemetery, traces of iron-processing were found. As well as slag, large pieces of forge material were found in this deposit. The pieces of clay were clearly heat-affected and even vitrified (burnt to a very high temperature resulting in a glassy material). The material was analysed and found to have been exposed to temperatures of more than 1200^{o} C. The fragments analysed was also shown to contain small drops of iron, confirming that iron smelting or smithing had been going on in the area. As mentioned earlier, the contemporary topsoil in the immediate area was also strongly affected by fire-related activity, as shown by the high degree of charcoal flecks in the soil. This suggests that a workshop dealing with iron smelting or smithing was placed south of the cemetery and deeming from stratigraphical relations to AMS-dated feature together with dateable pottery found in the deposit, the iron processing could very well have been contemporary with the cemetery. No structural workshop features have been found however. Further analyses of soil samples from various features may

be able to provide more detailed information about the organization and types of activity carried out in this area.

As stated above, there were also some pits found in this area. Their fills contained household waste as well as some personal objects, which show that the area was used not only for craft, but also for habitation. In spite of the fragmentary character of the material, one of the pits has yielded a quite extraordinary finds assemblage. This pit was rather isolated, but the fact that it was cut by a high medieval well does show continuity in the area. It was also cut by modern service trenches, and thus only survived partially. Its probable dimensions if complete would have been c. 2,5 m in diameter with a depth of more than one meter. The original function of the pit is unclear – perhaps it was used for storage - but its final function was that of a refuse pit. The fills contained finds including six bone combs, a bone bead, a bone pin, a glass ring, pottery sherds of Baltic Ware and "A4" – a Viking Age form, daub, a nail, slag and large quantities of animal bone. The combs were all types which date to the 10th-11th century, and together with the bead and the glass ring they represent the personal possessions of one or more persons living in the area at this time.

Figure 8 (a and b) Two of the combs from the "comb-pit".

Such a large number of combs deriving from a single pit does not have an obvious explanation (in fact all but one came from the same layer within the pit) . It is possible that they were disposed of when someone died, together with the other personal items. The animal bone assemblage was analysed and found to

contain a diverse menu of 16 species of fish as well as the usual domestic animals which were typically eaten. A large amount of cat bones were also identified, perhaps the remains of a single individual. Nothing in the animal bone assemblage indicates bone-working. The inclusions within the different fills reveal two phases of backfilling with a break in between, seen in a thin deposit of re-deposited natural clay separating the two phases. The earlier fills contain more household-related material, while the later fills contained more inclusions of slag and other iron-working waste.

AMS C14-dates have been retrieved from two fills – one of these dates back to the 10th century, while the other gave a date range of mid-11th-early 12th century. Given the only find of Viking Age pottery from the excavation, the late Viking Age style combs and the one really early C14-date, this pit seems to be one of the oldest features at Rådhuspladsen. Stratigraphical relations between dateable material in different deposits show there probably have been some secondary depositing in the pit, so it is unlikely that the pit should be from the Viking Age. However, in combination with the presence of the early (Christian) cemetery in the northwestern corner of the square, which looks to have continued towards the north, it must be considered a possibility that an even earlier, possibly late Viking Age settlement could have been situated further towards the north-northwest. The findings of the cemetery is either way a ground for archaeologists to be aware of the possibility of Early medieval, or even Viking Age remains in this area, when conducting excavations in Copenhagen in the future.

About ten other pits and wells from the early or high medieval period were located in this area. One of the later ones based on its artefactual evidence showed that smithing was still an ongoing activity. The pit was highly truncated by later activity, but several fills were preserved and the original shape and dimensions of the pit could be assessed. It had been a rather large circular pit, about 2,5 m in diameter, with a depth of almost one meter. Its upper fills contained quite a lot of slag material as well as some furnace lining, suggestive of metal working in the area. Other finds included nails, a copper alloy stud, a piece of copper alloy twisted wire, a pin and a brick fragment. A relative scarcity of animal bones and pottery sherds could indicate that the fills mainly came from a production environment with little evidence for household waste.

In the central part of the square there was also evidence for occupation and craft activity from the late 11th-early 12th century. A number of pits and wells were found within two small enclaves of preserved archaeology in an otherwise very disturbed area of the excavation. Fragments of a building (Structure F; in the excavation report Group 216) were also discovered, next to a small part of a presumably much larger road feature leading into the town area.

The road consisted of one main layer largely made up of slag and other production waste, plus several renovation and levelling layers. The stratigraphy between the road and the building shows that the early layers of the road were constructed prior to the building which was placed next to it. The building has been dated by three C14-analyses to early- to mid-12th century, which means that the road must be at least that old. The building remains consisted of seven small postholes and one cultural layer which probably related to the house. Finds from these features consisted of Early Greyware pottery sherds, a bone skate, a glass bead, copper alloy slag and large quantities of animal bones, including fish bones. Even though this building was very fragmentary, it has provided a lot of useful information. Apart from indirectly dating the road, its presence indicates that this area was not solely used as dumping ground with refuse pits, but had more diverse usage. A small building by the road could for example represent a booth connected to a workshop. Further south there were a number of intercutting pits of similar date, partly filled up with waste from iron

working. It is possible, that there were booths with trade functions along the road, with workshops connected to them on the plots behind. This is often seen in other early medieval towns in Scandinavia.

Another interesting aspect of the building is the finds which were retrieved. The presence of copper alloy slag and not only iron slag, and a glass bead, points to diversity of activity and in the groups of people that were present. Copper alloy working required another type of specialist knowledge, which indicates that people with this special skill lived in the area at this point, and the glass bead tells us that some of the people living here, or using the area, probably were women. Finally, the presence of a bone skate shows that the place was inhabited in the winter time, so it was not only a (summer) seasonal settlement.

Figure 9 Plan with building structure F and road.

Starting about 8 m south of the road and building there was an enclave of preserved archaeological remains, and this area had many intercutting pits and wells dating from the end of the 11th century to the 13th, or possibly 14th century. As with most of the pits further to the west, these were placed at a specific distance to the road going into town (about 10-14 m). If this perceived gap is in fact due to the heavy truncation in the area between the road and the majority of the pits or if it is showing something of how the area was organised is, unfortunately, unclear. Further studies will be made into actual depths of truncations and pits, to find out how deep the truncations were in relations to the depths of pits. Were the truncations deeper than the pits, so there is no chance of us knowing how the area in between the road and the preserved pits were used, or would the bases of pits have been surviving below the truncations if

they would have been present in that area? If so, we could argue that it is more likely that the middle area was occupied with other features, for instance buildings which would not have left such deep cuts in the ground.

Figure 10 Examples of intercutting pits and wells, heavily truncated

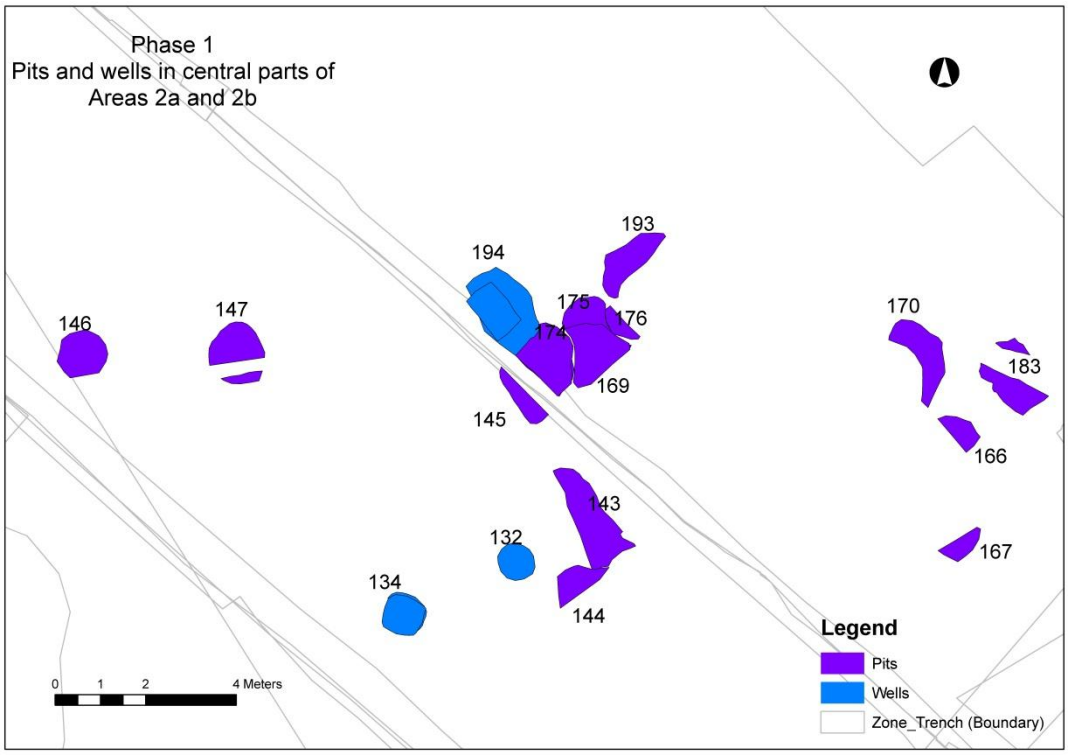


Figure 11 Plan of all early medieval pits (before A.D. 1250) in the central part of Rådhuspladsen

These pits were in general c. 1-2 m in diameter, and they were up to 2,5 m in depth. Most have been interpreted as having initially functioned as storage pits. Their sides were mostly steep or evenly sloping and their bases were even. There was generally little about their construction or primary fills which would provide information about their specific function. It appears that the pits have been kept clean before they were backfilled, and that – in combination with their regular shape – could be indicative of a function as storage pits. All pits and wells were backfilled with waste from households and production - mainly iron production. In a general way, they provide information about functions and activities in this area, about the people who were active here and about the organization of the area.

Nine pits within this enclave can be dated to the latter part of the 11th century or the start of the 12th. Some of these contained considerable evidence for iron working. For example, one pit contained several craft related objects and finds as well as some fills which showed evidence for an unknown special function. Among the finds were slag, furnace waste, copper alloy objects, a whetstone, and a bone awl/needle, but also household refuse like animal bones and early medieval pottery sherds. Twelve different fills were registered in this pit. Three of these consisted of red, very fine material which seemed to have been heat affected. There were also fills containing large quantities of charcoal (see Figure 12). A general trait for the pits in this central part of the square is that iron-working waste was present in backfills of almost all of the pits. There can be little doubt that one or more iron-working workshops have been situated in the area, even if there were no remains of actual smithies or *in situ* furnaces. The fact that the iron-working waste was present in pits with different dates also suggests that it was an activity which was going on for quite a long time – at least from the late 11th century to the 13th century.

Figure 12 A pit (left) and well (right), as seen in profile in Area 2A

The other early pits in the area had similar characteristics, although not so clearly dominated by iron-working activities. They contained many fills, with animal bones and early medieval pottery being the most common finds. Osteological analysis was made of the material in one of these pits, and it was shown to consist mainly of household waste, including many species of fish, apart from two sawn off cow horn cores which could be indications of bone working. Bone craft was carried out within the household at this time, only more complex objects, like combs, were made by specialized craftspeople.

The third and final main area of preserved archaeological features from the late 11th – early 12th century was situated about 30 m to the northeast of the previously described features, in the area around present day Vester Voldgade between Vestergade and Strøget. This was the area closest to the town's centre in the later medieval period, probably also early on in the medieval period. Thanks to the area being protected for hundreds of years below the high medieval rampart and the street surface of Vester Voldgade, more cultural layers were preserved in this area compared to other areas. This meant that more of the contemporary ground level and other surfaces could be investigated, providing information about activities and stratigraphic relationships between different features which were not directly next to each other. Larger levelling layers were also seen separating different building phases, aiding the interpretation of the chronological development. Together with AMS C14-analysis and pottery finds, a lot of information has been gained about the development of this area.

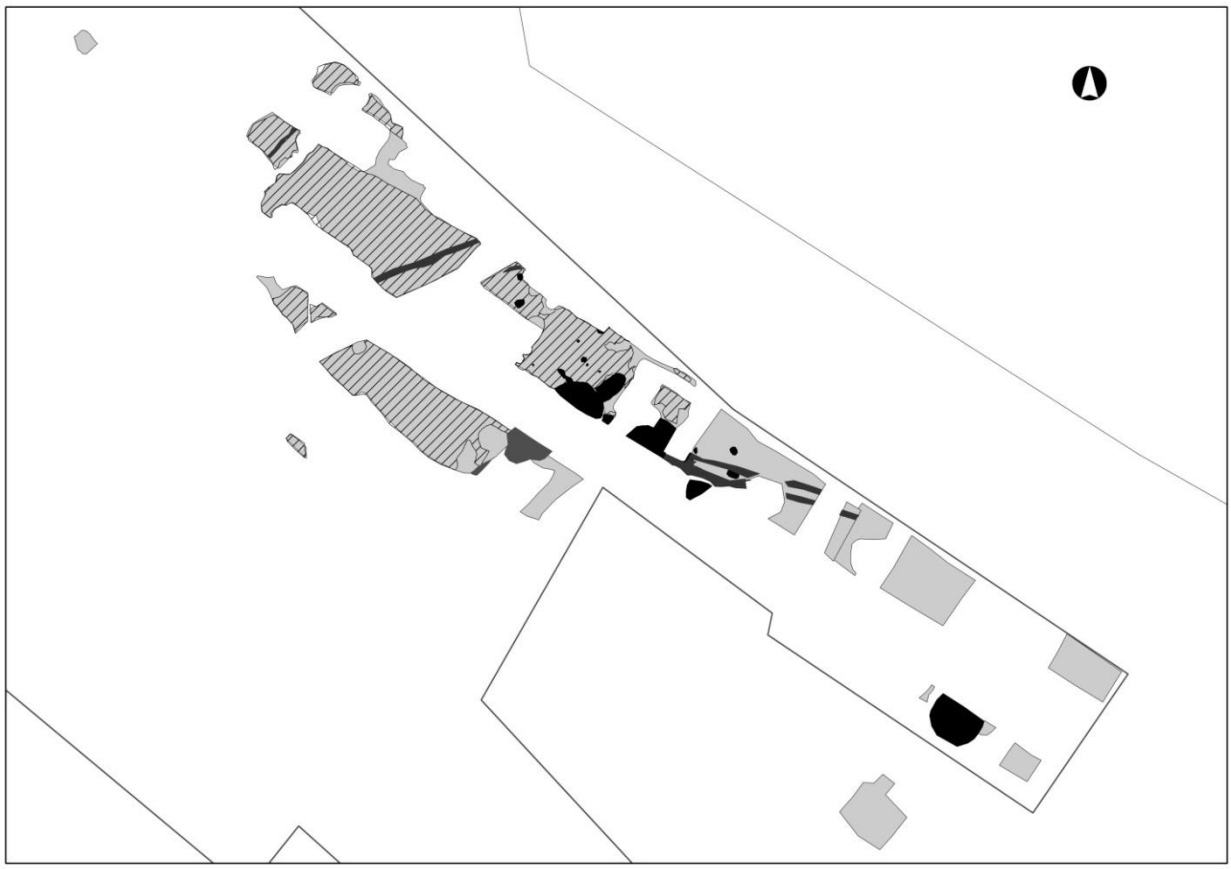


Figure 13 All features which have been interpreted as belonging to the oldest phase of activity in Vester Voldgade. Postholes and pits are black, cultural deposits light grey. The striped area represents the older phase of the metalled surface

A number of postholes were seen cut into the original topsoil, which was the ground surface at the time. There is no clear pattern between the postholes however, so it is uncertain if they belonged to the same construction – however they are all likely to have been parts of buildings or perhaps parts of a fence. Even though preservation was good in this area, it was rather small, and in many cases it was obvious that structures continued beyond the excavation area, obscuring interpretation.

The postholes have been assigned to two different structures, even if the relations are doubtful. The first structure (structure A) consisted of 11 postholes which have been grouped together. They were generally aligned northwest-southeast in two to three rows, but the spatial relationship between them may suggest that they could have been part of a building of changeable character, and that some of the postholes represent different phases of the building. Some are smaller than others, suggesting they might belong to inner constructions rather than roof-bearing walls. It is likely that the building continued outside of the trench to the northeast. An AMS C14-date from one of the postholes resulted in a date range of mid 11th-mid 12th century. As there were two more early medieval phases overlying these postholes, it is likely that the actual date lies in the earlier part of the possible date range.

There were parts of one further building from the late 11th-early 12th century in the area. Southeast of the building described above, there were some postholes and beam slots making up parts of what was interpreted as remains of a building (Structure B) which may have continued towards the northeast. There were two parallel beam slots, preserved at a length of five meters, which could have made up parts of a wall for a building, and three postholes which could have functioned as parts of inner structures (see Figure 14). The first building (Structure A) was sealed by a metalled surface (informal surface of pebbles, laid like cobbles), which was contemporary with the second building. Also, the first building was contemporary with a pit, which was cut by the second building, showing clearly that Structure B post-dated Structure A. The second building had a number of pits next to it (see Figure 15), which were later sealed by levelling layers as preparation for a further early medieval phase of activity.

The metalled surface covered an area of 15 x 10 m, and was truncated by later features on all sides except towards the north, where it merged with the early medieval road going into town. The truncations meant that we do not know the full extent of the surface. It was initially interpreted as a road, but it seems more likely it has been some kind of outdoor surface/open area next to the road going east-west into town. It was contemporary with the building Structure B and related pits, and was sealed by levelling Group 78. The surface itself consisted of small stones, c. 5 cm in diameter, with many pieces of slag and large animal bones mixed in. A range of finds were recovered from the deposit. These included whetstones, a wooden shoe last, one copper alloy padlock, an iron mount, iron nails, slag, copper alloy fragments and a flint blade. An AMS C14-date from one of the animal bones gave a date range of mid-11th-mid-12th century. The large amounts of slag used in the surface shows that large scale iron production was taking place in the area. The deposit then served two purposes, both as a clean surface and as a way of disposing of waste, from households (large animal bones) as well as production (slag). The fact that such a large deposit was laid using this kind of material is also indicative of a higher level of organization. As it appears to have been deposited at one time and not in different stages, it would have required some kind of joint effort or large scale activity.

Figures 14 and 15 First and second phases of usage in Vester Voldgade. Top: Structure A, Bottom: Structure B

Figure 16 The metalled surface in its older phase.

As previously mentioned, there were a few pits in the area which were contemporary with the oldest building structures (see Figures 14 and 15). Two of the pits have been dated by AMS C14-analysis to A.D. 1033-1139 and A.D. 1046-1142 respectively, and one of these had a very rich artefactual assemblage, including forge material, whetstone, a glass linen smoothener, a coin (unidentifiable), Baltic Ware pottery, and a large quantity of animal bones. Osteological analysis suggests that the bones represent the remains from one or more households, and the presence of lamb bones indicates a household with higher status. One more feature from this early phase should be mentioned. Without any clear relation to any of the buildings identified, a structural feature interpreted as a foundation cut was recorded. It was rectangular in shape, with rounded corners and a flat base. Its width was 0,55 m and preserved length 1 meter, but it was originally longer. Though quite shallow, it seems that its function was as a foundation cut for some kind of structure, but it is not clear what that might have been. It is quite wide for a beam slot, so another type of structure should be imagined. It is clear that the cut for the feature was respected by the metalled surface, so they appear to have been contemporary.

Covering parts of the stony surface, together with most of the structures presented above, were a number of deposits functioning as levelling layers covering a 17 x 5 m area. These layers were sealing the older activity phases from the next phase, which consisted of deposits and cuts stratigraphically and physically placed on top of the levelling layers. Because they sealed most of the features presented so far, they were of great importance for the interpretation of the chronology of activity. The new activity phase was

characterized by more substantial buildings and a large amount of pits. This new phase reflects an intensification of activities in this area, which took place sometime in the mid-12th century.

Intensified activity – c. A.D. 1150-1250

Staying in the area by Vester Voldgade, parts of three buildings were found to belong to the next phase of activity here. As with the oldest building remains, these were fragmentary, even if it was evident that at least one of them had been of a rather substantial character. South of these buildings were quite a large number of inter-cutting pits. It is clear that all of these not have been in use at the same time, but they were all in use approximately within the 100-year period between A.D. 1150 and 1250. To the north, the road leading into and out of the town went past. No clear evidence of plot borders were found, but the location of the different feature types nonetheless provides useful information regarding the organization of activities. A pattern which was hinted at already in the oldest phase becomes clearer at this point - south of the road, which probably was the main road into town from the west, buildings were placed and behind these were pits, used for storage and later refuse. Further south still, there were fragments of another building, perhaps a workshop. We know from widespread occurrences of slag and other production waste that somewhere in the area iron smithing has taken place, and perhaps also other craft activities.

Figure 17 Plan of structures in Vester Voldgade dated to A.D. 1150-1250

Close to the road or street going into town, a building (Structure C) was placed in an almost E-W alignment. Its remains comprised of seven postholes, fragmented floor layers and demolition deposits. The building was more than 8 m long (it continued outside of the trench to the east) and c. 4,5 m wide, and was built with wooden roof bearing posts. Close to one of the walls there were deposits containing large amounts of charcoal, degraded chalk and lime fragments, which could have been residue from a kiln related to the building. There were finds of early medieval pottery like Baltic Ware and Early Greyware, but also later types such as Late Greyware and Early Redware, indicating later usage from deposits directly above. An AMS C14-date from a barley seed in the kiln deposit produced a date of A.D. 1053-1159. Immediately east of this building a row of sill stones and postholes were located, orientated NW-SE (Structure D). Stratigraphic relationships show that these were later than the building Structure C, but they could represent a later addition to that building. The row of features was 5,75 m long. The postholes were placed about 3 m apart and the sill stones appeared in groups every 0,6 m. The placement of the individual postholes and sill stones, when compared with Structure C, suggests that a relationship between the two is likely. The row of features probably represented a wall belonging to a new building or to a later addition to Structure C. The rest of the structure would have continued further to the east, outside of the excavation area.

A few meters south-southeast of the building remains in Vester Voldgade there was an area where many pits had been dug during this period. In a c. 20 x 5 m area (disturbed by modern services) fragmentary remains of ten pits were found. In some cases it was clear that these were stratigraphically later than the ones presented earlier. In some cases a more precise dating than early medieval is uncertain, but on the combined basis of stratigraphical, spatial and artefactual evidence, a date of 12th century has been proposed. Due to intense activity in the area, deposits were somewhat disturbed and mixed, and in some cases upper fills in pits appeared to have gradually settled and sunk down into the pit and allowed later material to mix with the older original upper fills. This may explain how in some cases C14-analyses gave results which suggest that some fills were older than the dateable finds contained in them.

One of these pits was seen placed inside the area of building Structure C. It was a quite large pit (1,55 x 0,85 (truncated) x 0,85 m) with six fills, mostly backfilled with household and building refuse, for example Baltic Ware, Early Redware, iron fittings, nails, a possible stove tile, CBM (ceramic building material) and also animal bones including fish bones. As in most of the refuse deposits, slag was also present. Stratigrapically this pit seemed to be later than the Structure C, and the finds of Early Redware together with Baltic Ware indicate a quite late early medieval date. An AMS C14-date from a barley seed from one of the lower fills however provided a date range of A.D. 1036-1140. Perhaps then this pit had a long usage phase. It is possible that the pit might have been placed indoors and functioned as a storage pit below the floor in building Structure C.

Five meters further south there was a group of intercutting pits, of which two have been dated to within the 100-year phase mentioned above, while two were later. One of these contained quite interesting finds, providing information about possible bone craft, and containing objects like bone combs, a comb case, a bone skate, a bone stylus, a copper alloy barrel padlock as well as slag and pottery sherds. The bone craft related finds consisted of what is interpreted as debris from comb making in the form of about 50 flakes of roe and red deer antler as well as one unfinished comb.

The diverse and rich finds assemblage should be seen as an indication of the types of households and activities present in the immediate area. Finds of Late Greyware in the top fills and Early Greyware and Baltic Ware in the lower fills suggest a similar dating situation as with the pit associated with Structure C. The AMS C14-analysis of a cattle bone from the lowest fill suggests a quite early date of A.D. 1046-1142.

Figures 18 and 19 Comb case and Cu Alloy padlock from one of the pits in Vester Voldgade

In a very small watching brief trench about 12 m south of these pits, some fragmentary but nonetheless clear evidence of an early medieval building and another pit were found (Structure E; see Figure 20). In the side of the trench facing northwest there was a sequence of deposits and cuts seen in section consisting of two postholes, a floor layer and levelling layers over the floor layer. Below the floor layer there was a deposit filled with charcoal, possibly belonging to an older phase of activity. The floor layer was c. 10 cm thick and consisted of a mix of clay and burnt sandy material. The upper part of the floor layer was very hard and seemed heat affected. A small but almost complete pot of Baltic Ware was seen in the profile, in an upright position with its rim level with the floor surface. It could be seen in the interface between the rim of the pot and the floor surface, that the pot had been placed into the floor deliberately.

The pot is currently undergoing conservation. The contents were x-rayed but nothing was detected. Further analysis of the contents is being undertaken, but preliminary results show that the pot mainly contained ash. The pot must have had a specific function having been placed in the floor in this way – the ash residue points to *in situ* burning, so perhaps it had a function connected with heat or light, or maybe some craft-related activity. Other finds connected to this building fragment are Baltic Ware pottery sherds, slag and hammer-scale, which were found in the floor. It is therefore possible that the building was part of a smithy. Over the floor layer there were a few deposits which contained little cultural material. These have been interpreted as levelling layers, perhaps to raise the ground level for later usage of the area.

Figure 20 Profile of trench showing sequence of cultural layers connected to the building Structure E. In the right part of the area with preserved cultural layers from the building, the pot which was placed in the floor can be seen. Seen towards north

Large parts of the excavated area by Vester Voldgade were reorganized again about the mid-13th century. This was seen in levelling layers being deposited on top of the early medieval features. However, more activity took place further west at Rådhuspladsen in the early medieval period. This was a continuation of the earlier usage of the area, and unlike the area in Vester Voldgade, the level of activity was about the same compared to the earlier phase. The road leading into and out of town was still in use, and in the area of preserved archaeology at a distance south of the road, there were eight pits and three wells which have been placed within the 100-year period of A.D. 1150-1250. Just south of the road there were remains of three additional pits, which belonged to a later phase than the building structure F which has been AMS C14-dated to the early 12th century.

Three of the pits in the central area were dated by AMS C14-analysis to A.D. 1077-1215 (Group 169), A.D. 1130-1234 (Group 174) and A.D. 1154-1232 (Group 183). These results have been used in combination with stratigraphy, spatial relationships and finds to obtain an approximate dating range for these pits and the ones related to them. The characteristics of the pits were similar to the earlier examples in the area. They were generally quite large, with steep sides and flat bases, filled with household waste and production waste. A few had special traits, which with further analysis could provide more information regarding function. A few examples will be presented here.

Pit Group 174 was a sub-circular pit with steep sides and a flat base. It contained six fills, with a thin lens of usage deposit followed by a clay lining. The lining points to the pit having been used for “clean” purposes, and to a need to create a new phase for this clean usage. The overlying deposits contained a mix of household and production waste, and a large quantity of fish bones. A mandible (jaw bone) of goat was found, suggesting that goat was eaten. Cut-off horn core from sheep points to a workshop close by. Lamb bones are generally indicative of a high status household. One of the lower fills was different from the others – it was quite thick (10 cm), and contained household and production finds, but it had an “oily” character, as if some particular organic material had degraded in the deposit. One sherd of Early Redware in the fill combined with the AMS C14-date indicate a date in the early 13th century.

A few meters to the south there was another pit (Group 143) and a well (Group 132) which may also have been related to iron working, or at least were placed close to smithing activities. On the basis of stratigraphy and finds, these are likely to date to the mid-12th century. The pit was slightly truncating well Group 144, which with its distinct layers of red material and furnace fragments was also interpreted as having related to smithing activity (see earlier in this chapter). The pit Group 143 was of substantial dimensions, 2,4 m in diameter and 3,15 m deep. The depth could suggest that it should instead be seen as a well. Only some of the pit was preserved in plan, and in section a total of 18 different fills were identified. The fills and their contents show evidence of a range of activities taking place nearby at the time.

The upper fills appeared to have been been tipped in from the side. Deeper down the fills covered the whole width of the pit, while towards the base there were fills present only in the central parts. These contained large amounts of reddish baked clay with imprints as of wattle. The central placement could indicate that it had belonged to a smaller structure like a kiln or furnace being thrown down after it was discarded. The fills of the pit in general contained large quantities of slag and also hammer-scales, which is strong evidence for smithing in the immediate area. Other finds included pottery sherds of Early Greyware and Baltic Ware, copper alloy clippings, a bone needle/pin and animal bones including fish bones. The osteological analysis suggests that most of the bones came from a household context. The well Group 132

was placed directly beside the pit Group 143 and contained much the same kind of fill material, with large amounts of daub and possible kiln lining. The daub and baked clay in these features suggest the deconstruction of buildings or workshops at the site in the mid-12th century.

About 12 m to the east, a somewhat different pit was investigated. Pit Group 183 was 1,6 x 1,05 x 0,9 m in size with concave sides and a bathtub-like shape. Based on stratigraphical relationships with pits Group 170 and Group 166 which were seen to have been older, and a C14-analysis of a seed from one of the lower fills which gave a result of A.D. 1154-1232, this pit can be dated to the second half of the 12th century or the beginning of the 13th. Eleven fills were identified in the pit. The lower fills were quite different in character from the lower fills in most of the other pits, which usually were devoid of finds and inclusions and were rather sterile. In this pit the lower fills contained large amounts of fish bones, and the fills were either sticky, organic or in one case “crunchy”, as if the contents had been mineralized.

Osteological analysis of the fish bones showed that the material contained all parts of the fish, making it unlikely that the material was the result of any kind of processing. In all, 13 species were present in the material, with herring, gadids and eel predominant. Also present in the material were large quantities of millipedes of a kind that eat decaying wood. Apart from the fish bones, the animal bone assemblage from the pit included household waste from butchered animals, as well as cat, dog and rat. The presence of lamb bones in the pit indicates refuse from a high status household. Given the information at hand, it is likely that the pit initially had a function as storage for fish. The specific shape of the pit suggests a specialized usage, and the finds of many fish bone from all parts of the skeleton in the lower fills, points to storage before eating rather than left-overs from meals. Later backfills show the normal types of household refuse.

The cluster of eight pits and three wells from within the hundred-year period A.D. 1150-1250 should be seen as a continuation of the activities in this area which started in the latter half of the 11th century. The density of activity as well as the types of activity seems to be about the same. There were traces of both household and production waste, including evidence of deconstruction of structures made of wattle-and-daub. There is nothing in the archaeological material which suggests that the activities were seasonal. The relatively high degree of intercutting between pits indicates that the available area was limited, and that it is likely that the apparent placement of these features at a certain distance from the road leading into town is not only due to the lack of preservation of the area in between, but should be seen as the result of organisation of space and activities, perhaps with buildings along the roadside and storage pits and possible workshops behind the houses. The area has not been very densely settled however, which was seen in the macro-environmental analysis, but instead the household and production waste material may derive from perhaps as few as two households based in that area at that time, a settlement pattern that might also be likely for the rest of the investigated area, including present day Vester Voldgade.

Phase 2 Urban consolidation – A.D. 1250-1370

Main structures: Burials, road, building remains, pits

Introduction to Phase 2

It has already been discussed how the activities in the western part of the square continued much as earlier into the high medieval time period. While the excavated part of the cemetery was abandoned by the mid 12th century at the latest, metal working seems to have been ongoing until the area was taken out of use in connection with the construction of the town gate, rampart and city moat around A.D. 1370 (see Phase 3). There were also traces of household activities throughout this time period, even if they were fewer than further east. In the area of present day Vester Voldgade the intensity of activity was continuously great in the high medieval period. Several re-modellings of surfaces took place, which meant some changes to the physical organization of the area, and also some continuation and strengthening of older infrastructure. The earlier activity was characterized by many pits and a couple of buildings, while in the high medieval period the area seems to have been largely covered with a street surface with buildings at the side of it.

Phase 2 Description

As a foundation for the new layout a series of large levelling layers were deposited, and over that, a new surface was constructed, likely acting as a street and mainly composed of iron slag and other iron-working waste. This surface was very compact and the sheer volume of material used shows that iron production was significant in scale at this time. The surface as it survived covered an area of 15 x 4 m, and had been truncated in all directions except to the south. Evidence for iron-working was present in many of the medieval features, from the very early layers and pits in the western part of the square to the high medieval surfaces in the east by Vester Voldgade. There can be little doubt that iron production has been of importance in this area from the outset. From written sources we know that the street Vestergade (which is directly east of the excavation area and can be seen as the continuation of the medieval road seen during excavation leading into and out of town) was called Smedgade (Smith Street) during the late medieval time period. Also, from the excavation of nearby Skt Clemens cemetery in 2008 we have evidence of smithing from the northern part of the cemetery in the early and high medieval period. This area was only c. 50 m from the high medieval slag surface in Vester Voldgade.

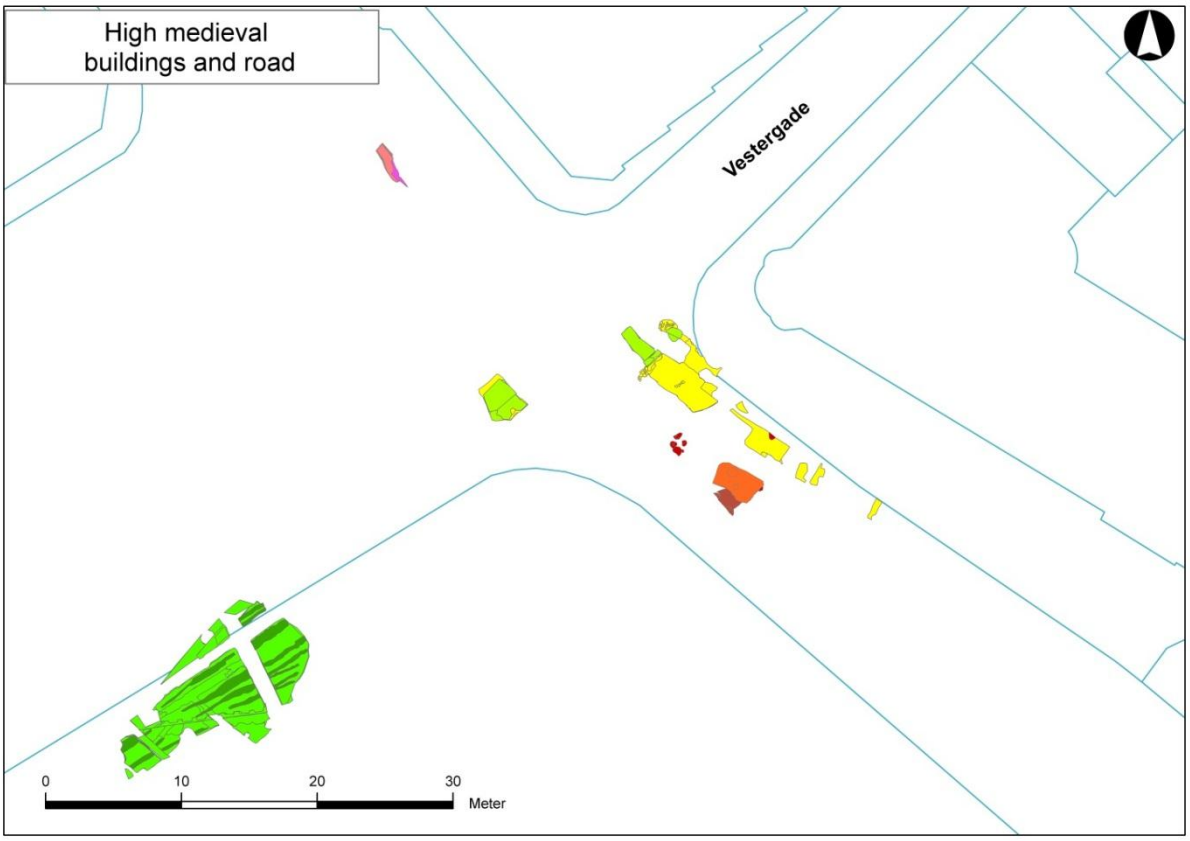


Figure 21 Remains of buildings and roads from the high medieval period which are discussed in the text. The road leading towards the town centre is marked with green, the surface/street Group 80 is yellow, and the cobbled street Group 113 is seen in light green. The building fragments are depicted with reddish colours: top left building H and I; south of surface Group 80 the sunken floor belonging to building G. It gives an impression, even though fragmentary, of buildings on both sides of the main road at the point of present day Vester Voldgade, which were in the high medieval period to become the place for the town rampart.

Present day Vestergade was one of the main streets through town in the medieval period. The road Group 76, which already has been presented in the early medieval section can , as stated above, be seen as an extension of Vestergade and has certainly been in use through most of the medieval period, until the construction of the outer gate in the 1500s. Wheel ruts were preserved in different parts of the road, all pointing to an alignment towards Vestergade. It is highly likely that the decision to place the western town gate and bridge at the start of present day Vestergade in the 1370's, is a reflection of the fact that this route was already the main approach to the town of Copenhagen from the west. Overlying the early street surface but preceding the construction of the medieval gate, parts of another street surface (Group 113) were seen with a large stone kerb and a well laid formal cobbled surface. The remaining parts of this surface suggest that it measured more than 3 m in width and at least 12 m in length, going southwest-northeast. It was dated by C14 to A.D. 1242-1296. This shows that even before the placement of the gate here in the 1370s, this was a road of some importance.

Figure 22 Part of a cobbled road (Group 113) dated to the later part of the 13th century

From this period, remains were seen of ten different buildings in total, all of them in the eastern part of the modern square. Some of them only consisted of a few postholes or fragmentary floor layers, but they are nonetheless evidence of an increased building activity. The fact that more building remains were preserved from the high medieval period than the earlier phases might be due to preservation, as this phase was the last settlement phase before the area was sealed under the medieval rampart or by the street following the inside of the rampart. It is also possible however that the eastern part of the square saw an increase of urban activity during the high medieval period, while the role of the western part was already decreasing, preceding the complete exclusion of this area from the town once the fortification was built in the 14th century.

Pits, which were so characteristic of the early medieval phase, were also being dug during the high medieval phase but on a smaller scale. In some cases activity layers were seen filling up the older pits and in general the buildings and surfaces took up more room and the pits seemed to be less important. Most of the wells encountered during the excavation can however be dated to this period – or at least their backfills can. This can be considered a change in the organization of activities in the area, though it seems that broadly the same types of activities were still going on. Perhaps as the buildings took up more space close to the main streets leading into the center of the town, features like storage pits and refuse dumps had to be placed further back on the plots. There was no definite evidence seen of plot borders, but that may be due to bad preservation with shallower features such as fence lines or boundary ditches not surviving.

One of the more substantial buildings Structure G, has been interpreted as part of a sunken floored building, or a building with a small basement by Vester Voldgade. The sunken floor could have been part of a larger building with a northwest-southeast orientation, or could have been a smaller building with approximately the dimensions suggested by the cut for the sunken floor. Remains of the building consisted of a construction cut for the floor, postholes, floor deposits, “trample” surfaces and deconstruction layers. It was constructed in two stages; both phases have been dated to the high medieval period on the basis of

some sherds of Early Redware pottery. Both stages represent phases of sunken floors or “half-basements”, indicating continuity in usage.

The cut for the first sunken floor measured 2,4 x 1,7 m, although the cut had been truncated to the west and it is not clear how much larger it was originally. The cut was 0,75 m deep at its deepest and within it there were three postholes and a trample layer as well as a deconstruction deposit. The postholes might represent structural support for the building. The trample layer consisted of three very thin deposits just above the base of the cut. Nothing in them revealed what function the building might have had. The cut was later backfilled completely by deposits filled with domestic waste. One of these consisted of baked clay, which probably came from the collapsed superstructure of this phase of the building. Partly on top of, but also next to the older cut, there was a new cut for a sunken floor, representing the next phase of the building. The remains of this phase consisted of a construction cut, postholes and a floor level, as well activity layers comprising of organic silt and a large amount of fish bone. Over these deposits there were a series of backfills. The construction cut measured 3,5 x 2,1 m and it was up to 0,7 m deep.

Osteological analysis was made of the fish bone rich activity layers. They were shown to primarily consist of either head fragments from herring, or complete specimens, though a total of 12 species of fish were identified, including eel, cod and plaice. More than 300 herring heads were counted from a sample analysed, but there were many more. Presence of garfish shows activity in the spring/summer part of the year. All species could have been caught locally. One of the layers was in fact composed only of herring heads, and was probably an accumulation of fish processing waste. The quantity and concentration of fish bones was on a scale which makes it likely that it was associated with a fishmonger or a fish market. Pieces of Early Redware pottery date the usage of the building to the high medieval period. The backfills comprised of a mix of different types of deposits, suggesting they were dumped from different places and possibly over a period of time rather than as one action. These deposits produced finds of pottery (Early Redware, Late Greyware and German Stoneware), a chape, an iron knife, nails, slag, rope fragments and animal bones (cattle, pig, sheep/goat, dog, swan and grey seal), along with red deer antler fragments, one with cut marks, indicating refuse from a workshop.

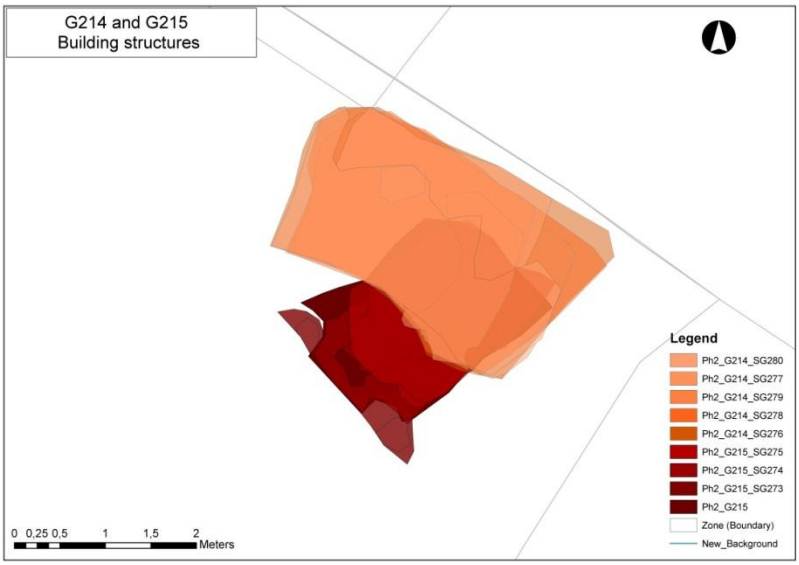


Figure 23 Plan of the two phases of sunken floor building G in the area by Vester Voldgade

The remains from this two-phased building were rather fragmentary, making interpretation difficult. It is clear though, that fish processing took place, and so the building was probably associated with the local fish trade in some way. Backfills contained material related to general activity in the immediate area, including food waste, tools, iron production waste and waste from an antler workshop. The sunken floor structure has probably been part of a larger house which had a half-basement in one part, perhaps with stairs leading down from street level. There are examples of this type of house from other towns in the region, such as Malmö. The building Group 214/215 was probably contemporary with the slag surface/street running southeast-northwest to its east.

A further 30 m to the northwest, north of the medieval road into the town, the partial remains of another high medieval building were found in a narrow watching-brief trench. Though the area of preserved archaeology was very small, 3,8 x 1,7 m, it was clear that a substantial building with several high medieval usage phases had been located there (Structure H, in the excavation report Group 195), as well as traces of older structures underneath. The evidence from this trench is important, as this small enclave of archaeological deposits was the only significant medieval remains preserved north of the medieval road, and shows that the activity north of the road seems to have been of a similar character as that to the south (see Figure 21).

The small area of preserved archaeology was truncated to the east by modern services, while the western part continued outside of the trench. Within the trench a sequence of thin horizontal layers, some postholes and an oval feature were seen. Together they have been interpreted as a building with up to six phases of floor layers, and an oven. The floor layers were comprised of clay deposits or silty sand, and between them there were thin lenses of activity layers consisting of sand and organic material. The last of the floor layers was located 0,5 m higher than the earliest. The oven belonged to the fourth floor level and consisted of an oval depression filled with a lens of heat-affected sand above which was a sterile clay deposit which seemed to form the lining of the oven base. Over this there was a dark brown, organic deposit, from which a heavily corroded copper alloy knife was retrieved. In the fill layers of the oven, a layer of woodchips was found.

Figure 24 Remains of multi-phased high medieval building (H & I)

The artefactual material found throughout the deposit sequence can be firmly dated to the high medieval period. This dating is backed up by two calibrated AMS C14-dates, from a goosefoot seed in the second floor layer (AD 1266-1366) and from a seed in the oven (AD 1293-1377) related to the fourth floor level. The location of the building is such that it is highly unlikely that it would have been allowed to stand here once the medieval rampart, moat and bridge were built just south of these remains around A.D. 1370, so taking all the evidence into account, a usage period of late 13th-mid 14th century is most likely. Finds and macro-environmental analysis indicate that this was a domestic building. Among the finds recovered from the floors and usage layers were fish bones, animal bones, pottery sherds (Late Greyware, Early Redware) and an iron chisel. Macro-environmental analysis of the fill of the oven showed a range of weed seeds, but also Goosefoot and White Mustard, both of which indicate culinary usage.

Sealed below the oldest floor belonging to this building were two inter-cutting pits and two small wooden stakes. Both pits were only partially preserved and only animal bones were found in their fills. Beneath the pits were the remains of another floor, interpreted as belonging to an older building (I) placed here before building H. The floor consisted of a thick clay deposit placed on top of an older, thin and very organic layer. The clay deposit probably served as a levelling layer to even out and raise the ground level to prepare for later activity. The organic layer had a chocolate-like consistency, possibly the remains of a decomposed and compressed wooden floor, compacted under later deposits. The finds from these deposits included pottery sherds (several sherds of Baltic Ware, Early Greyware, some Early Redware and Late Greyware), slag, iron nails, a flint blade, fish bones and animal bones, and are indicative of a domestic environment. This structure is likely to date to the early 13th century and tells through this of usage of this part of the excavation area back in the early medieval period.

The macro-botanical evidence from these deposits was quite informative. It showed that a range of plant species of culinary as well as medicinal character had been used in the building in question. Remains of large quantities of wild strawberry seeds, hazelnuts and mustard seeds were present in the samples. Also henbane seeds were found, now considered poisonous but in medieval times and earlier used as a painkiller as well as a psychoactive drug. Sun Spurge (Madwoman's Milk), another poisonous herb but with medicinal properties was also present. Other seeds, like Goosefoot and wild strawberry have medicinal use as well as being edible. All together, the macro-botanical evidence and the finds material point towards this building being the remains of a domestic, even perhaps as specific as a kitchen environment – perhaps also with some medicinal healing going on.

If buildings and surfaces were characteristic of the eastern part of the excavation area during the high medieval period, the same was not the case in the central and western parts. Quite different preservation conditions however may have prevented the survival of any larger areas of cultural layers. If there had been more buildings and surfaces from this period, it is possible that they simply have not survived. Instead, a number of wells and a few pits were seen – these features being more likely to survive later disturbance due to their depth. Most wells from the excavation were from the high medieval period, while the earlier phases of activity had more pits and only a few wells. This may indicate a change in organisation of the area, or alternatively new ways of dealing with the storage of food and other commodities, an increased need for water, or a different way of disposing of refuse. Some smaller areas of activity layers, which should be seen as deposits built up due to human activity, covered parts of early medieval pits, as well as areas

between the pits, suggesting that the area continued to be used in the high medieval period but the way in which it was used changed, hence the pits have been deliberately filled in and sealed.

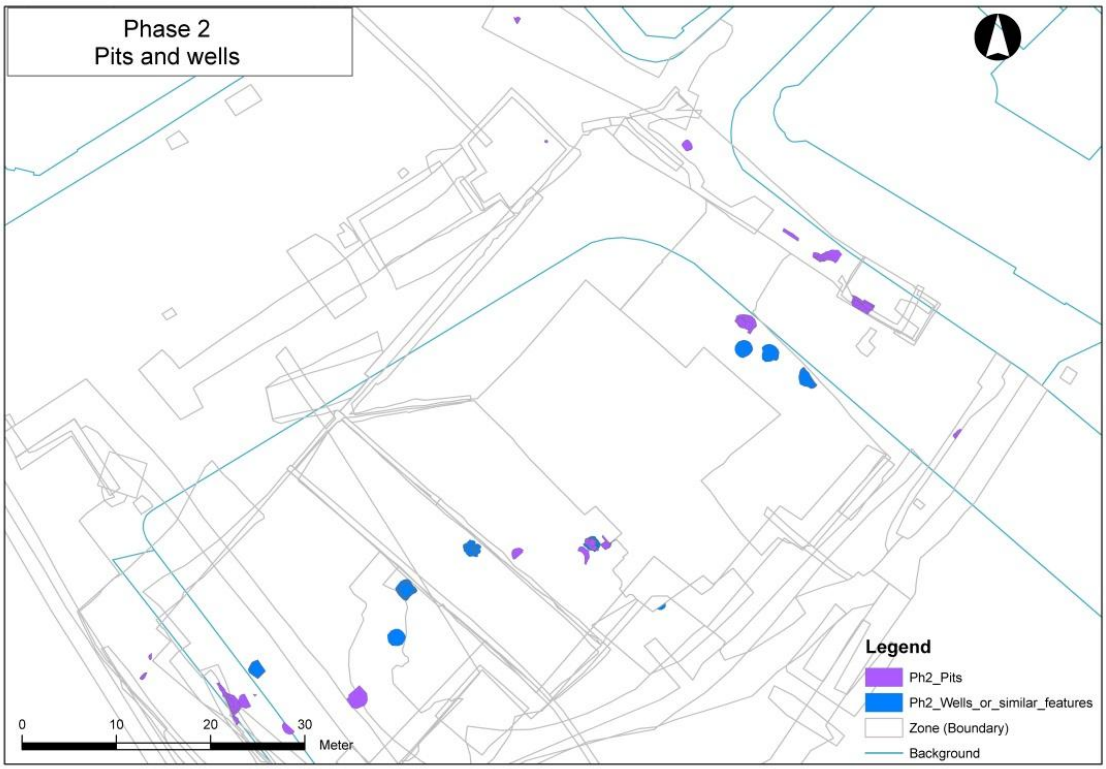


Figure 25 Pits and wells from the high medieval period

As alluded to previously, wells and pits from this period were mostly seen in a linear area that ran southwest-northeast, following the same orientation as the medieval road Group 76, but at a distance of c. 12-14 m south of it. Nine wells, or well-like features, and 27 pits were documented from the high medieval period. Of the 27 pits however, quite a few have somewhat uncertain dating due to a lack of evidence, and may be somewhat older in reality. In the central parts of the excavation area there were fewer pits and wells than had been the case in the early medieval period, with just six pits and five wells identified. The relatively high amount of wells compared to pits is a clear change from the early medieval period, when the amount of pits was greater and also relatively more frequent than wells. Among the cluster of truncated pits located in the western area, quite a few did not have any dateable material in them, and could also belong to the early medieval period.

In Area 1 by Vester Voldgade, there was a cluster of six pits in the southern part, mainly placed south of the slag street surface and southeast of the building with sunken floor/basement. The pits had not been in use at the same time, but were probably used in sequence, one or two at a time. This is supported by the fact that some of the pits were intercutting, and also by the dateable material which show some to be from the early part of the high medieval period and some from the later part. The shape and type of contents of the pits were similar to the early medieval ones, and they have likewise been interpreted as storage pits with a secondary usage phase as refuse pits. One of the earlier examples was pit Group 32, which contained early medieval pottery (Early Greyware and Baltic Ware) as well as high medieval pottery (Late Greyware and

Early Redware) in the upper fills. Slightly cutting this pit was pit Group 49, which also produced a mixture of early and high medieval pottery, as well as a horseshoe of a form used in the 13th century. This pit also contained finds such as a whittle tang knife, a brick fragment, daub, nails, slag and animal bones (from cattle, pig, sheep/goat, cat, hare and cod); overall an assemblage indicative of a domestic environment.

A few meters northwest of these features were a series of highly intercutting pits. Two of these (Groups 61 and 63) have been placed in the early medieval period, while two more (Groups 60 and 66) were of high medieval date. Their proximity suggests a continuation of the activities related to the usage of the pits. Pit Group 60 was rather large, about 2 m in diameter and 1,4 m deep. The basal layers were quite sterile, and appeared to relate to a period of silting up of the pit. The original usage is thought to have been as storage, and above the sterile-looking deposits much more finds-rich deposits were seen, which were likely related to the dumping of waste. Among the finds were slag and burnt clay, probably waste from a furnace, many jug fragments of Late Greyware and Early Redware, proto-stoneware, Baltic Ware, daub, nails, bone working waste, copper alloy fragments and a large quantity of animal bones. The waste which was thrown in to the pit indicates that the surrounding area was used both for domestic and production purposes at the time. Apart from the iron-working residue it is noteworthy that evidence of bone working was also found.

Located further southwest within Area 3, a few meters south of the sunken floored building, were a group of three wells which have all been dated to the high medieval period (Groups 254, 260 and 269). All of these had been partially truncated by the cut for the medieval moat and/or the watermill. They were circular, each about 2 m in diameter and were about 3 m deep as they survived. The backfilling showed similar patterns – they seemed to alternate between wet, organic deposits and dry, more sterile ones, maybe suggestive of periodic or cyclical use, followed by deliberate backfilling. The wells were dated by stratigraphy – they were older than the moat cut – as well as finds of high medieval pottery in the backfills.

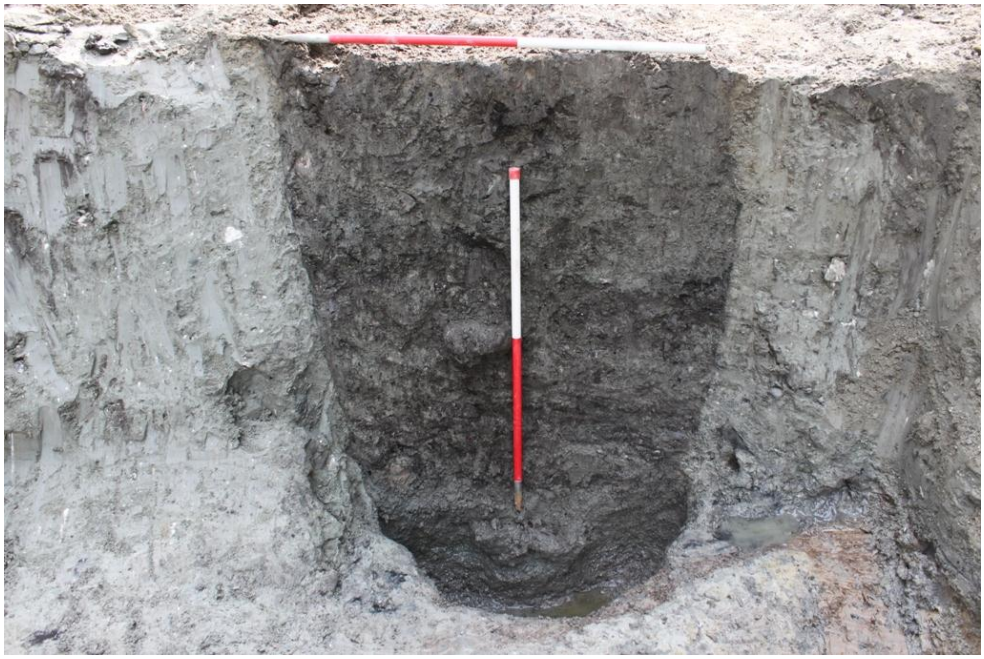


Figure 26 Profile of well Group 260.

In one of the wells (Group 254) there were quite a lot of finds, for instance a complete wooden bucket, a bone needle or pin, a piece of cord, a possible stone cannonball, nails, a flint blade and animal bones. This well was selected for a core pollen sample, which generated interesting results. Two organic horizons from the core were analysed, and revealed similar results. A large amount of Sweet Gale and Hemp pollen were identified from the samples. Sweet Gale was used in medieval times for brewing, tanning or dying textiles yellow. Hemp fiber was used for ropes and other textiles. The hemp fibers have been interpreted as deriving from ropes which have been used in the well. Sweet Gale was present in such a quantity that it is likely it has been placed in the well. Bark and shoots from Sweet Gale were used in the tanning process, and the large amounts of charcoal and uncharred organic material in the pollen sample could be remains of bark. The results from the pollen analysis in combination with the shape of the features could suggest that rather than being wells, these features may in some cases have functioned as tanning pits. It is worth mentioning that the basal fills of at least one of the features was seen to contain quite a lot of bark.

The pollen samples also provided more general information on the environment at the time. They indicate an open area with singular leaf trees and grass. Many of the herbs present in the sample grow in settlement environments, for example nettle. The amount of pollen from cereals shows that crops have been grown in the vicinity.

In the central and western parts of the excavation area there were also a number of pits and wells from the high medieval period, acting as a continuation of the early medieval usage. These were, as stated earlier, placed in a linear area with a southwest-northeastern orientation, running parallel to the road into the central parts of town. The intensity of activities seems however to be less than previously, even if the most western parts perhaps show a slight increase in the number of wells. Also, in some smaller areas there was still highly intense activity, seen in the fact that high medieval pits were inter-cutting, and the same small area was reused for the same type of pits over a period of perhaps 200 years.

The only example from Rådhuspladsen of a well with a timber frame was found in this area. It was located under the edge of the outer gate foundation (see Phase 4) which had truncated the well horizontally. The cut for the well was almost square (1,9 x 1,82 m), but deeper down somewhat more rounded. Its surviving depth was 1,95 m. The timber lining consisted of a base timber frame, four corner posts and wall planks horizontally set into the frame. There were two fills within the well, the lower possibly built up during usage and the upper was likely a backfill. Finds included a range of materials, but were clearly of high medieval date: Early Redware, Late Greyware, Stoneware, Baltic Ware, a bone toy, flint blades, bricks, nails, slag, and iron fittings, a fragment of a key and animal bone. Macro-botanical analysis showed a variety of weeds and a fig stone.

The high medieval pits surviving in the central parts of the present-day square were mostly highly truncated by modern ground works and the information they revealed was limited as a result. Nonetheless the pits seemed to be broadly similar to the ones located in the better preserved Area 1 in Vester Voldgade. Their backfills contained a mixture of household and iron production waste, while the original function of the pits left few traces. It is thought that they represent storage pits connected to households and workshops located on the same plots, later used for waste disposal. Some of the pits did not contain any dateable material, but are thought to be high medieval in date due to stratigraphy or to proximity to other high medieval features. A number of the pits however had more specific attributes and provided more information on the activities taking place here.

Located within an area of early and high medieval activity was a pit Group 209, which was placed directly over a high medieval well. It was cut into the backfills of the earlier well. Whether this was deliberate or due to a lack of space, is unclear. It would have been easier to dig into loosely compacted backfills than into clay sterile ground, but this would not usually have been a factor. The pit was sub-circular, measuring 0,82 m x 0,64 m and 0,33 m deep. The base was lined with a sterile clay deposit, 0,1 m thick, making the base of the pit flat. Within the pit, another layer of clay was deposited, which contained large amounts of fishbone. The quantity of fishbone within the deposit indicates that fish were probably stored here, perhaps as part of a production process. The fish represented in the pit were gadids, herring, eel, cod and haddock. Apart from fish bones, the pit also contained some animal bones, nails, daub and pottery (Early Redware, Late Greyware and proto-stoneware). Among the animal bones, lamb bones can be said to indicate a high status household, and a sawed-off part of a (cattle) metatarsus (from the lower leg) which is a long and straight bone, is believed to be waste from a workshop, perhaps from comb making. The bone assemblage overall has been characterized by the osteologist as material of mixed origin (both household and production). AMS C14-analysis from a barley grain found in the fish bone deposit gave a calibrated date range of A.D. 1228-1274, which indicates that both this pit and the well beneath it (based on ceramics and relative stratigraphy) were in use in the 13th century.

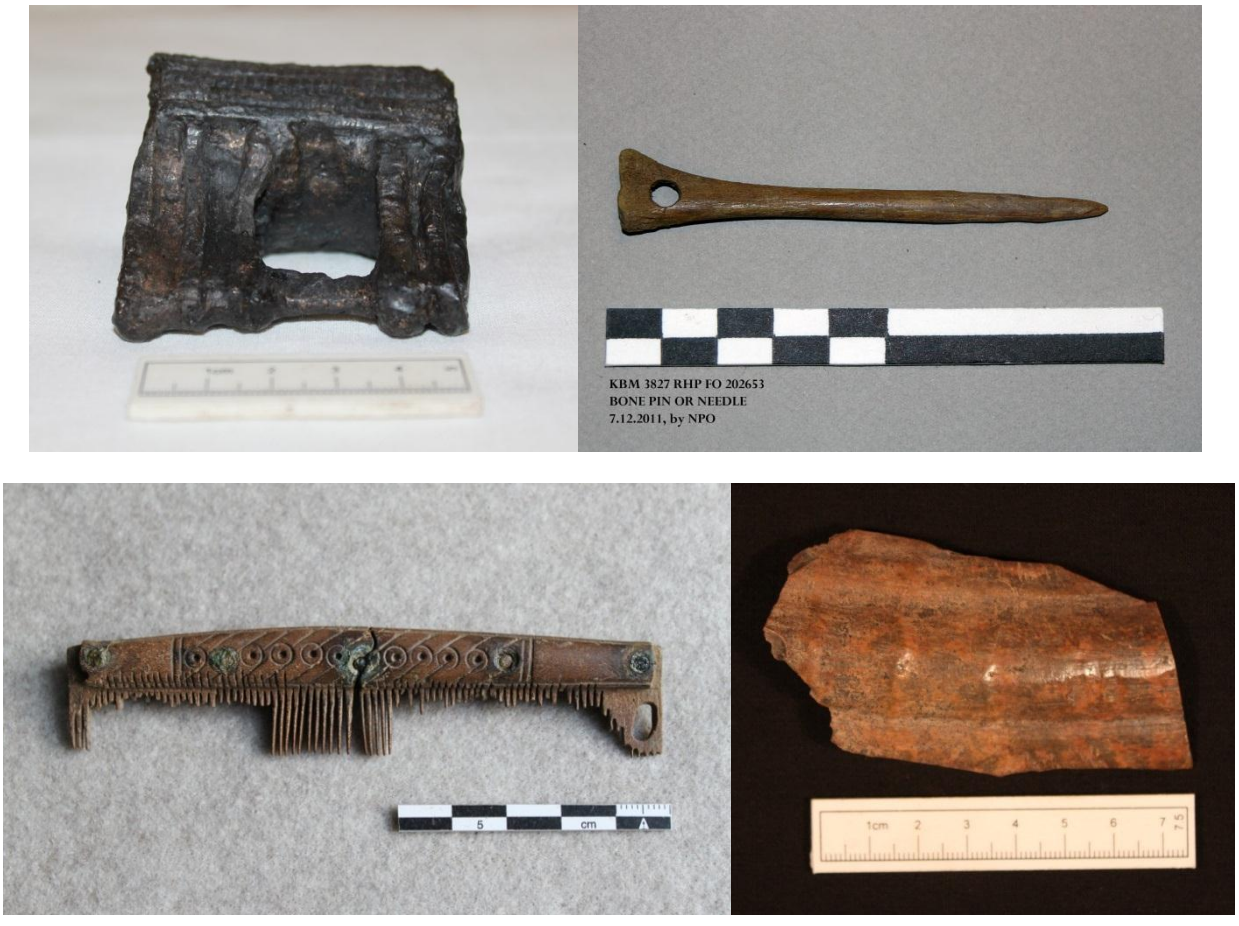


Figure 27 Some medieval finds from pits and wells at Rådhuspladsen. Top left: Copper alloy padlock; top right: bone needle; bottom left: bone comb; bottom right: piece of worked walrus tusk

Across the excavation area there were groups of deposits, levelling layers or activity layers preserved in small enclaves, which on their own are difficult to interpret, but when they are considered together with all the structural evidence and the infrastructural features, some possibilities emerge. One example is a series of deposits grouped as activity layers (Group 181), but interpreted as representing a yard area with activity going on alongside the road Group 76. These deposits overlay the slag street surface Group 80. The activities related to the yard have probably been going on for some time, as the soil was both seen to have been contemporary with the cobbled street Group 133, but also had gradually encroached onto the cobbled surface. Finds from the deposits consisted of pottery (Early Redware, Late Greyware and Siegburg stoneware), brick fragments and animal bones. It is evident that the area was being kept open, but not used as a street at this point. We might imagine a phase when there was a slag surface under present day Vester Voldgade, next to a cobbled street running east-west into Vestergade, and a later phase when the slag street surface was covered with soil to form an activity area of another type, but with the cobbled street surface going into the town center still in use.

Another feature category of infrastructural importance is ditches. It has been stated previously that few features interpreted as plot borders have been found during the excavation. Dated to the high medieval period, there is one feature which might be interpreted as a border ditch. Part of a ditch Group 37 was found located in a narrow watching brief trench south of the excavation area in Vester Voldgade, running in a northwest-southeast direction. No finds were retrieved from the ditch, which was mainly observed in the trench profiles. It was 1,2 m wide, 0,9 m deep and had an observed length of 2,5 m. The fills were quite sterile, perhaps as a result of silting up, but lenses of charcoal suggest cultural activity close by. With limited evidence, the ditch can be dated either to the high medieval or the early medieval period, but not later.

Figure 28 Rowel spur found in the ditch along the road leading into town.

Towards the west, there were two parallel linear cut features (Groups 376 and Group 213) which have been interpreted as drainage ditches associated with the road Group 76, which ran in the same direction. They were observed for a distance of c. 9 m within the excavation area. The width of the cut varied between 1 and 2 m, its depth varied also between c. 1 and 0,1 m. If the features should be seen as drainage ditches, the varying dimensions could relate to topography in the area around the ditch and the road at the time. It was c. 5 m between the parallel ditches. Both contained large amounts of slag material, and also a variety of pottery: Baltic Ware, Late Greyware, Early Redware, German Stoneware; metal finds (a 15th century rowel spur, a buckle, a decorated fitting and more) and animal bones. The finds assemblage indicates both

iron production and household activities in the area in question, and the dating of the rowel spur suggests that these ditches may have continued in use until at least the 1400s.

The high medieval period at Rådhuspladsen can be seen both as a period with continued activity and also as a decline in intensity of some activities. The cemetery in the west had been abandoned already in the 12th century, and the high medieval remains could indicate that even if iron production, perhaps comb making and a spectrum of household activities is observed in this period, the intensity is somewhat less than in the early medieval period. Perhaps fewer households were based here during the higher medieval period. This could be part of a development that saw an increased focus towards the east, ending with the total abandonment of this area sometime in the mid-late 14th century in connection with the construction of the first recognized fortification at Vesterport.

Phase 3 Reorganisation and defence – A.D. 1370-1500

Main structures: moat, two bridges, city gate, rampart, roads, pits

Introduction to Phase 3

We have seen from the early and high medieval evidence, that Copenhagen was emerging as an evolving urban space as early as the 11th century, and grew in significance, probably in tandem with the construction of Absalon's Castle in the 12th century in a position where it would defend the town, and the presumed establishing of the town defences. These were likely a moat and rampart or wall, as hinted at by references to the *Byens Planker* (town's planks) from as early as the 13th century. However, no evidence for this early defensive construction was seen during the excavation at Rådhuspladsen.

Phase 3 at Rådhuspladsen saw significant developments that suggest a major restructuring of the town's layout, and a new emphasis on fortification. The key development was the placing of the city moat and rampart along the edge of present day Vester Voldgade in about A.D. 1372. Prior to this there had been significant activity going on west of where the moat would be placed. This could suggest that the town boundary prior to that – if there was one – was located further west originally, enclosing that activity. Alternatively it may be that a less substantial boundary further east, or perhaps in this location, was adhered to loosely, with activity going on outside it. Either way, it seems that from about A.D. 1372, everyday activities were no longer going on in a significant way outside of the town moat. The moat ran northwest to southeast across the excavation area, and divided it into two parts, the 'inner city' side to the northeast, and the larger area to the southwest located outside the town. Few conclusively late medieval features were found in the external area.

A gate was also constructed about this time, and a substantial wooden bridge over the moat, and later a bridge of stone and brick. This new emphasis on defence and having a very formal edge to the city, may have come about as a result of the sack of Copenhagen castle by the Hanseatic League in A.D. 1368. While no records document what happened to the town during this attack, it is unlikely that it went unscathed. So along with rebuilding the castle, it is likely that a new emphasis was placed on the town itself being defendable. It is worth considering that when the Roskildebispens Jordebog mentions Vestergade in c. A.D. 1377, as "the street by Vesterport", it may be that the gate was a rather new structure. Such constructions must have been organised centrally, perhaps by the king, or by the town administration. They would have required significant planning and organisation of people, and a large expenditure of labour, time and money.

It should be stated that while the evidence points to the development of a bridge and gate in 1372, it is possible that the moat was already in existence in some form prior to that, but as of yet, no evidence has been found to support an earlier date. A small area of intact original medieval silted fills in the moat base were identified in a final watching brief in 2016, and samples taken from these layers have provided dating material that support a 14th century date for the moat (see below).

The dating of the high medieval fortification

The defence related structures (moat, bridge, gate and rampart) were probably established at about the same time, as they would have functioned in tandem. The first bridge as we have seen dates to about A.D.

1372, which indicates a probable date of construction for the moat, gate and rampart also. The road surfaces are more difficult to date, but were certainly in use during the phase in question, though it is likely that they were in existence for some time. The second bridge from about A.D. 1438 was likely an upgrade of the first bridge necessitated by wear and tear. Apart from a new bridge being built, it is likely that otherwise the main structures seen in Phase 3 continued in use up until c. A.D. 1500 without significant alterations.

Phase 3 Description

The late medieval period (between about A.D. 1350 – 1500) saw considerable changes in the emerging town of Copenhagen, as seen from the excavation at Rådhuspladsen. It could be summed up as a time of crisis and recovery. It was also a time of continuity however, with the ongoing urbanization process seeing the consolidation of the location as a town of some considerable importance. The late medieval remains seen at Rådhuspladsen were heavily impacted by later activities in the area – both archaeological and modern. Nonetheless in some areas of the site some at least of the late medieval material survived, enough to piece together a good deal of what was happening in this area at this time.

Figure 29 Schematic plan of main high medieval features

Borders and Communication

The eastern side of the excavation area at Rådhuspladsen ran more or less along the middle of Vester Voldgade (*Western Rampart Street*), the city's former defence line to the west. It was no surprise then that moat layers were encountered close to the eastern side of the excavation area.

The Late Medieval City Moat

The late medieval moat as seen during the excavation measured 21,5 m in width, and had a depth of about 6,5 m. It was cut deep into the glacial clay underlying the area. Approximately 55 m of the moats length was exposed across the various excavation areas at Rådhuspladsen, though the moat only partially survived having been truncated by many modern disturbances, most obviously the underground toilet building built here in 1941.

Figure 30 The moat in Area 3 during excavation, with primary fills still in situ. Seen from above, from northwest

The northeast edge of the late medieval moat was partially removed by the construction of a later watermill (see below). In fact it was only in Area 4 that the moats full width was seen. While c. 55 m of the moats length was seen, this was of course just a small part of the moat, which would have continued on to Nørreport to the north, and to the sea to the east-southeast. The sides of the moat were quite steep, and climbing straight up the side unaided would have been almost impossible. The moat was cut into the natural clay, which in this area was extremely compact. Towards the base of the moat however, sandy layers were seen, where the water-table was encountered. Here (based on what was seen during excavation) it seems likely that there were problems for the constructors with the moats edge eroding, and this may explain the placement of a wooden platform which was laid along the outer half of the moats base (see below).

Seven deposits were identified which were likely to have been primary late medieval silted fills, as opposed to later backfills. The few ceramics seen (Baltic Ware, Late Redware and Late Light Fired), were perhaps

suggestive of an early post-medieval date. It is possible though that these very waterlogged deposits had later material sink into it from above. Further finds included a horseshoe, a barrel lid, a whetstone, nails and animal bones (including horse, dog, cattle, goose, goat and sheep/goat. Samples produced lithics, charcoal, burnt and waterlogged seeds, shells and animal bone. One sample produced significant amounts of weed seeds, particularly of *Brassica Nigra* (Black Mustard) and *Stellaria Media* (Chickweed). The former can be used for culinary purposes. The large quantities seen of these two species could indicate that the deposit formed in a relatively short period of time, as there was little diversity in its make-up.

A final watching brief undertaken in 2016 in the area under where the mill and later the underground toilet building had stood, provided a glimpse of the very deepest deposits in the moat. These had been sealed over by the mill foundation, and were more intact than the layers seen in 2012. One piece of Baltic Ware was recovered, raising again the possibility of an earlier date for the moat. Samples taken provided material for macro-environmental analysis and AMS C14 dating. The deepest layer seen in the profile was a largely sterile layer on silty/sandy material. Lying on the surface of the moat cut at the very base, a preserved thistle head was recovered. A seed from this was dated using AMS C14 analysis to 1275-1400 AD (2 Sigma Cal, LuS 12014). Within this range, 1335 – 1400 AD was most likely. This date range overlaps with the dendro dates for the first bridge, and suggests that the moat was first constructed in the 14th century. While the moat could date to as early as 1275 AD, the dating of the bridge to 1372 AD points to this year as probably being about the time the moat was completed. It could of course have taken some years to dig.

The second layer in the moat was more organic in nature, and heavily lensed suggesting that it was water deposited over time. A bulk sample from this layer was floated for environmental material, and analysed by Annine Moltsen. The sample was rich in material, and seeds of various pond weeds were seen, as well as sedges, buttercup, docks, nettles and many other common weeds. The assemblage points to a wet environment, with water-based and wetland species seen. By and large the assemblage suggests a freshwater environment, with possible influxes of salt water at times. A seed of bur-reed and of hazel were selected for AMS C14 analysis. These returned dates of 1265 – 1395 AD (2 Sigma Cal, LuS 12015) and 1290 – 1410 AD (2 Sigma Cal, LuS 12016). These dates overlap between 1290 and 1395 AD, and suggest the moat was in use from somewhere during this period. Again, the dendrochronology dates from the bridge fall within this range, and suggest that 1372 AD was when the moat actually came into use.

Based on the available information then, it seems most likely that the moat is of late medieval date. The finds assemblage was not very significant in scale, but it is notable that the pottery was both early medieval and early post-medieval in date. The frequency of finds was considerably lower than in the moat backfill layers, which were very rich in urban waste. The finds in these deposits were much more reflective of material casually lost in the open moat rather than deliberately dumped in bulk.

The Bridges of Vesterbro

It was fortunate that the only section of the medieval moat within the excavation area that was preserved to its full depth and width was directly outside the former medieval western gate, where the former bridge would be encountered. Two phases of late medieval bridge were identified, as well as one late medieval/early post-medieval bridge. This bridge would have been the original *Vesterbro* (western bridge), which would later give Copenhagen's western suburb its name.

The oldest bridge appears to have been constructed entirely of timber, and has been dated by dendrochronology to A.D. 1371/2. No older timbers were found on site; hence we can suggest that this bridge represents a phase of construction that may also have included digging the moat for the first time in about A.D. 1372. If an older moat or bridge existed in this location, no traces remained. This first bridge was found in two areas, on the eastern edge of the moat, just southwest of the medieval gate, and spanning the moat base in a southwest to northeast direction.

Figure 31 Plan of bridge elements, from c. A.D. 1372 (yellow and lilac) and later additions (green)

Figure 32 Two layers of bridge beams were seen in the base of the moat. Seen from southeast

The most substantial part of the first bridge was comprised of a series of wooden piles driven into the base of the moat, and tenon-jointed to crossbeams with support posts. The timbers were of oak. As mentioned above they were felled in the winters of A.D. 1370/1 and 1371/2. The wood came from the Lund region and south Sweden area. How structural elements would have extended off the crossbeams to form the superstructure is unclear, either having been removed during a deconstruction phase or occurring outside of the excavation area.

Another section of this bridge was identified just west of the medieval gate, on a step on the eastern side of the moat (shown in lilac in Figure 32). Measuring c. 4 m x 3 m, it survived as an incomplete framework of horizontal oak timbers, jointed into a substantial timber block at the northern corner. The structure had been truncated in the past to the southwest and southeast, and had decayed at a higher level. It has been interpreted as an upper part of the bridge, based both on location, date and form. The timbers were from Lund and Zealand. They dated to post- A.D. 1361, and 1406 +/-7. The later date may relate to a repair of the structure.

The orientation of this upper bridge element was very similar to those parts seen in the base of the moat, as were the construction materials and construction methods. A direct physical link between these structures could not be made during the excavation, due to their degree of preservation. The upper element sat close to the medieval gate, suggesting that these were also related. Taken together, all structural elements mentioned appear to have formed part of a wooden bridge that spanned the medieval moat, linking the city gate with the area to the west, and carrying traffic to and from the western road into Copenhagen. Dendrochronology samples produced dates from A.D. 1361, 1370/1, 1371/2 and 1406 (+/- 7). Collectively these point to a date of construction in about A.D. 1372, with the date of c. A.D. 1406 probably representing a phase of repair to the upper levels of the bridge.

An interesting observation with regard to the dating of this first bridge is that it was constructed shortly after the castle was sacked by the Hanseatic League in A.D. 1368, and therefore could be seen as part of a reactionary strengthening of the town's defences. It is likely that the moat (in this location) and the western gate also date to this phase of construction. It is possible that a moat existed here before this time, but, as stated above, no evidence for this was seen during the excavation at Rådhuspladsen in 2011 and 2012. In time this bridge was replaced. This seems to have occurred twice, once in the high medieval period, and once in the late medieval/post-medieval period.

The second bridge phase (late medieval) represented a large scale rebuild of the first bridge, with almost none of the original bridge re-used, except perhaps as a sort of platform upon which to commence construction. This second bridge saw the construction of a large platform of timber on the west side of the moat, and potentially on the east also (this was not seen due to excavation constraints). On top of this platform a foundation of large boulders was placed, and on this a more formal platform of brick and mortar laid. It is not clear how the upper portion of this bridge would have looked as it did not survive, it may have been of brick, stone or timber.

Figure 33 Bridge timbers exposed crossing base of moat, the boulder foundation seen in section. Seen from southeast

The surviving structure spanned most of the width of the moat, immediately southwest of the gate. The lower part consisted of a number of timber structures. The largest of these was an irregular platform of timbers on the western side of the moat (see above), while other elements comprised timber uprights which defined the channel at the centre of the moat. The moat was narrowed considerably in the area of the bridge (from c. 21.5 m to 4.5 m), thereby creating a narrow channel at the centre of the moat cut. This re-modelling dictated the width of the moat under the bridge arch until it went out of use in the 17th century.

The timber platform described above provided the boulders with a stable platform upon which they would rest. The main elements of the timber construction were northwest to southeast orientated beams overlain by a cross beam and two rows of tightly packed upright posts approximately 4,35 m apart. The timbers were of oak and beech. Some of the timbers were re-used, one of which was originally shaped as a stake, or were made using lower quality soft timber. A section of upright wattling was also observed along the inner side of the water channel, and appears to have acted as a retaining structure or mesh to hold back smaller material from slipping in to the water channel.

Together the wooden platform and boulder placement could have been put down both to form a base for a new bridge, and to prevent the moat's edge from eroding (this occurred quite quickly during excavation as ground water bubbled up at this depth). Few traces of the superstructure survived, but there were two possible mortar and brick foundation platforms (overall dimensions 5,4 m x 1 m x 0,6 m deep, individual brick size: 0,27, W: 0,12, T: 0,08). These may represent the footings for either timber or masonry bridge piers which did not survive.

A number of timber samples were taken, and were dated by dendrochronology to c. A.D. 1436 and 1437/38, with one older timber from c. A.D. 1400 presumably having been reused. This suggests that this bridge was constructed in about A.D. 1438 or soon after as a replacement of the original bridge, c. 66 years after its construction. There is a historical reference to King Christian I having improvements made to 'planks and bridges', in about A.D. 1455. It is possible that this second bridge could relate to these improvements. As the elements described above were allowed to remain in situ when the final bridge was constructed, we can assume that there was no fault in the bridge foundations at that time. The reason for upgrading the bridge a third time may be explained by the need for a higher, more substantial or more ostentatious bridge.

Rampart

Adjacent to the eastern corner of the medieval gate a series of clay deposits were recorded, which have been interpreted as a remnant of the medieval rampart. These extended c. 6 m in a southeasterly direction from the gate, though the extent to which they survived was defined entirely by modern truncations, except where they abutted the gate. It is interesting to note that these deposits overlay medieval street layers with dates in the 13th or 14th century, again suggesting that this area had probably been without fortification until about this time. A number of ceramics of high medieval date were recovered, in the form of Early Redware and Early Greyware. One sherd of Late Greyware was also retrieved.

Medieval City Gate (Vesterport)

A structure of mainly stone was located in the northwestern end of Area 1 and the northeastern end of Area 4. It was situated directly southwest of Vestergade, which was formerly the main street entering Copenhagen from the west. It comprised of a number of structural cuts, stone constructions and bonding deposits placed within the cuts. The cuts were made through some older archaeological deposits, and into the natural clay beneath, and formed a foundation for both the western gate and a wall which projected outward from the western corner of the gate towards the moat and bridge to the southwest.

Figure 34 The outer foundation of the medieval gate as it survived, truncated both lengthways (by a wooden waterpipe) and to the southeast (left in photo)

The cut was stepped in some areas to follow the topography. It was filled by layers of stone and sometimes brick, laid in layers and bonded using clay in the deeper layers and compact sand in the upper layers (the gate foundation was made up of 19 stone layers and nine bonding layers, the projecting wall was made up of two brick layers, five stone layers and two kinds of bonding material. Where bricks were laid they were bonded using mortar, and it is likely that this represented the interface between the foundation and the wall itself. The wall did not survive, having been demolished in the past, probably in the early to mid 1600s.

The gate itself, based on the foundation remains seen, measured just under 9 m x 9 m, while the projecting wall extended ca. 5,1 m to the southwest of the gates western corner. It is likely that a similar wall would have extended from the gates southern corner, but this had been removed. The gate foundation was also badly preserved, having been truncated many times down the years, even as early as the 1600s when a wooden waterpipe trench was dug through the foundation.

The projecting walls would have connected the gate to the bridge to the immediate southwest, possibly preventing the embankment from slumping on to the road. It seems likely that the gate and the projecting wall were built at the same time.

Figure 35 The east corner of the foundation, mid-excavation. The foundation cut had gone through several layers of archaeological material, as can be seen.

The overall plan of the foundation was square, and was aligned to face Vestergade. It also lined up with the bridge seen in Area 4, and so we can state with confidence that this foundation is that of the city's former western gate. At almost 9 m x 9 m in plan, it was a sizeable structure, and with foundations that were almost 1.6 m deep, it is likely to have stood between c. 3 m and 5 m in height above ground. Given the well-built foundation, we can presume that the gate building itself was also a sturdy structure of brick and possibly stone. Finds were rare, but included medieval ceramics (Early Redware and proto-stoneware), copper alloy fragments (including possible coins and buttons) and a piece of glass. The pottery types seen are in line with a date in the 14th century, most likely up to A.D. 1375, but potentially a little later.

The layers that the foundation was dug through were medieval, and based on finds, date to as late as the mid 14th century. This suggests a significant amount of activity going on here during the high medieval period, with various re-modellings of the area/restructuring of the public space. As the wooden bridge elements seen deep in the moat dated to c. A.D. 1372, it can be suggested that a large program of construction including the gate, a moat and bridge was undertaken at about that time. It is interesting to note that the western gate (Vesterport) is first mentioned historically in Roskildebispens Jordebog (Bishop of Roskilde's Property Register) from the 1370s.

Further Late Medieval Activity

Pits

Located in the north-eastern corner of Area 2B, a pit was documented cutting into the natural clay geology. This pit measured 1,23 m x 1,12 m, though as it extended outside the trench, it full size is unknown. Its depth was 0,35 m. It was filled with dark silty clay, which produced finds of animal bone (pig, sheep/goat

and fish) and a single fragment of glazed stove tile, which has been identified as dating from between A.D. 1450 and 1525. The original function of the pit is unclear; it may have been used as a cess or waste pit.

A small pit in Area 2B has been dated to the late medieval period based on a calibrated AMS C14 date from an elderberry seed (*sambucus nigra*) of cal A.D. 1425-1635. The pit was located on the edge of the post-medieval moat in Area 2B, and it otherwise produced no dateable material. Fragments of cat and pig bone were identified. The function of the pit unfortunately is unclear, but may have been used for storage and/or waste disposal.

Phase 4 Expansion of defences and infrastructure – A.D. 1500-1600

Main structures: Brick bridge, moat revetments, demi-lune, outer gate, outer moat, sluice, pits

Introduction to Phase 4

The period A.D. 1500-1600 at Rådhuspladsen saw a series of alterations to the defences and infrastructure at the western edge of the city, changes which reflect the advancement of Copenhagen's western boundary from a medieval form to a post-medieval form. These changes saw the construction of a stone based and brick-arched bridge over the city moat, replacing the previous version thought to be of brick and timber. This occurred around the year A.D. 1500, and seems to coincide with the placement of a wooden revetment or fence-line along the inner edge of the moat, as a structural or defensive addition to the moat.

Following on from these changes, a small semi-circular outer moat or demi-lune was constructed outside the western gate in order to add an extra layer of defence to the approach to Copenhagen from the west. This was constructed in about A.D. 1530, based on dendrochronological dates, and was in use for a few decades at most. A timber structure that was initially thought to be part of a mill race, is now seen as likely to be the northern terminus of this demi-lune, and was dated to c. A.D. 1537 based on dendrochronology.

Figure 36 The oldest map of Copenhagen from c. A.D. 1590, western gate area to the left (Lorenzen 1930, kort I)

It seems that the demi-lune was filled in by the middle of the century or soon after, with the establishment of a much larger outer moat that was placed somewhat further out from the city. This would have had a large rampart along its inner edge, though this did not survive. It is possible that initially this moat also had

a roughly semi-circular shape in plan, or was at least curved, and it seems likely that this is the construction depicted on the first map of Copenhagen from about A.D. 1590. In tandem with the construction of this new outer moat, an outer gate was also constructed. This faced to the south-southeast, approximately at a right-angle to the inner gate, in itself a defensive layout. This gate was later redesigned with a new façade added. This may have been as late as A.D. 1618, when it is believed that Christian IV had the front of the gate rebuilt.

A new outer bridge was constructed on a series of vertical brick pillars or bridge piers. To the immediate west of the outer gate and extending from it, a substantial stone, brick and mortar wall was seen, built leaning slightly inwards, and running in a southwest to northeast direction. Surviving to a maximum height of c. 4 m, this appeared to have been a part of the first bastion or ravelin in this area, and implies another reworking of the area outside the original western gate. It seems that the outer gate was reworked into this new more angular defence system, which is likely to have been built after A.D. 1590, but before A.D. 1624 when the Swedish spy map appears to depict this angular bastion structure.

Throughout the period of these changes, the original inner moat seems to have remained open and in use as a moat, hence technically the 'bastion' was in fact a ravelin during these years (as it was detached from the main defences), but this too would change early in the 1600s.

Phase 4 Description

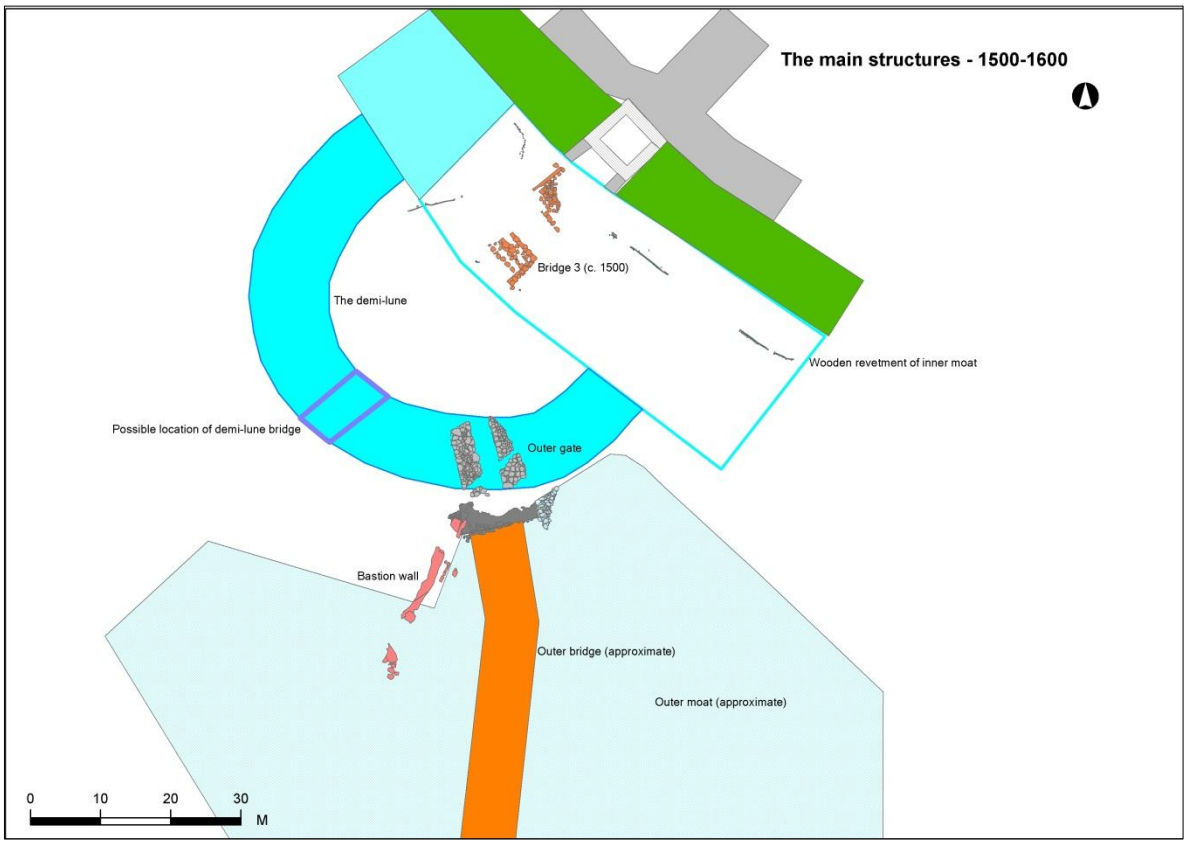


Figure 37 The main features in Phase 4, including demi-lune, outer gate and outer moat

The end of the late medieval period and the first part of the post-medieval period (between about A.D. 1500 and 1600) saw further developments in the city's defences and infrastructure. At this time the infrastructure was upgraded in line with changes elsewhere in Europe, with an emphasis on the construction of sturdy brick and masonry structures, for both practical and perhaps aesthetic reasons.

The majority of the archaeology encountered from this period consisted of large scale structures, mostly indicative of defence and communication, such as moat elements, moat revetments, a new bridge, a new outer city gate, a water-channel and sluice, as well as a number of pits. Some of the defence-related improvements were probably established at about the same time, as indicated by the dendrochronological dates. Alterations were ongoing however, with the outer moat constructed twice in different ways and locations, suggesting an obsession with continually improving the urban defences.

The first of these moat alterations saw a semi-circular moat constructed in front of Vesterport, creating an island that would have to be crossed before encountering the main moat and entering the city. This arrangement is known as a ravelin or a demi-lune (half-moon), and in this semi-circular shape was a 16th century phenomenon that originated in Italy. This form of defence was in turn replaced by angular ravelins in the second half of the 16th century, and so too in Copenhagen. At some point in the latter years of the century the demi-lune in Copenhagen was filled in, and a new outer gate was constructed on what was now a bastion. Bastions were first used in urban defence in Italy, specifically in Verona in the late 1520s.

The bridge by Vesterport was rebuilt in about A.D. 1500 (based on dendrochronology), with the construction of a stone and brick arched bridge. A nearby water channel and sluice seems to date from about the same time, and may have been part of a program of works to ensure a continuous supply of water to the moat. A wooden fence or revetment within the moat also dates to about this time (based on dendrochronology), so it seems that an effort was being made to upgrade the area around Vesterport in about A.D. 1500.

The establishment of significant new urban defences in the Vesterport area in the 1500s – apart from defensive needs – may have related to a desire to keep up with new trends in urban defence. These constructions would have been organised centrally, perhaps by the king, or by his administration, requiring significant planning and organisation, and a large expenditure of labour, time and money.

Fortifications

The Revetments

A series of revetments were identified along the sides of the medieval city moat, mainly along the inner face. The revetment probably acted both as a delineation of the moats edge, and also as an additional barrier to movement/access. They comprised almost entirely of angled wooden uprights in the form of stakes. Some horizontal beams were also seen. The timbers were all of oak. The revetments measured 52 m in length but extended beyond the area of excavation.

Figure 38 Wooden moat revetment (mid-excavation)

Individually the posts were c. 0,1 - 0,15 m in section, and up to 1 m in height (surviving), but the upper parts had decayed. The timber stakes were driven into the clay that the moat was cut into, while the horizontal planks lay alongside the stakes, generally up slope of the stakes. The structure ran northwest to southeast, following the alignment of the moat, and was more or less horizontal, without any notable slope over its 30+ metres. It was placed some metres above the moat base, perhaps where it would have been above the water level of the moat.

The timbers used showed signs of having been used for other purposes prior to being shaped into stakes. This suggests a practical approach to repair/ongoing reconstruction of the revetment. A range of samples were taken in order to obtain dendrochronology dates. 14 dates were retrieved, and ranged over a period of over a century, but date clusters were apparent. These were centered around c. A.D. 1421-60 (3 samples), c. A.D. 1502/3 (4 samples) and c. A.D. 1530 (4 samples). The dates suggest a structure which was being rebuilt in an ongoing way from perhaps the early to mid 1400s, with a rebuild about A.D. 1500, and repairs up to about A.D. 1530. As the moat was in existence from c. A.D. 1372, this structure appears to have been part of a secondary phase of work on the city's defences, perhaps constructed at about the same time as the second bridge in about 1438, and maintained for up to a century thereafter, including a major reworking around the time the brick and masonry bridge in Area 4 was built.

Given the relatively lightweight form of the revetment, it may have acted more as protection against erosion along the side of the moat and rampart than in a military sense, though perhaps it could also have acted as an obstacle to people climbing up the inner face of the moat. North of the bridge the revetment curved outwards at its southern end, presumably to meet the bridge. It is interesting to note, that at 3,64 m above sea level, the structure north of the bridge was c. 1 m higher up than the revetment south of the bridge. This could suggest that the moat stepped down by a similar amount in the environs of the bridge, being deeper/lower on its seaward side.

Moat fills

Located in Area 4 beneath the arch of the third bridge, a series of layers composed of mixed rubble and silt were excavated which it is believed were contemporary with the third bridge (1500s). The high percentage of silt within the deposits suggested water-borne deposition. A large number of finds were recovered from these deposits, and these finds differed considerably from those in other (later) moat fills. Finds such as an armour chest plate, as well as fish hooks, knives etc, suggests that these layers may date to the time when the moat and bridge were actively in use. Many of the finds were probably casually lost items. These layers appear to date to the time between the construction of the third bridge (c. A.D. 1500) and the building of the mill race (c. A.D. 1600). This dating takes into account stratigraphy, find types and dendrochronological samples. This makes this a rare example of a large definitively 16th century moat deposit from Rådhuspladsen. Some of the vast array of find types encountered in these deposits included: a decorated breast plate, stove tiles, rope parts, a coin, fishing hooks, keys, knives, pins, copper spoons, a wooden spoon, a bone needle, a stylus, pottery, glass, an awl, lead window came, a possible pewter brooch, shoes, and a lace chape.

Figures 39, 40 Possible pewter brooch (left) and breast plate (right)

The semi-circular moat (demi-lune)

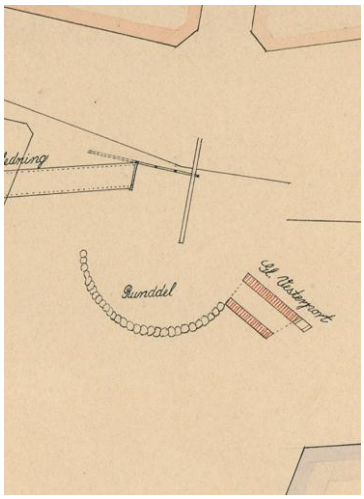
A large curvilinear cut feature was situated in the north-western part of Rådhuspladsen, across several trenches. The feature consisted of a large semi-circular in plan, ditch-like cut, which in some places was approximately 10 m wide, but narrowed considerably in the south-eastern part. Its depth was c. 1,8 m, with a base level of approximately 3,7 m above sea level. It had a surviving length of c. 45 m. The base of the cut was generally flat, but rising in the south-eastern part. It has been interpreted as a semi-circular moat,

defending an area in front of the city gate. This type of defence is known as a 'demi-lune' (half-moon), and originates in the 16th century.

Within the primary fills a narrow ditch or slot-trench was cut in to which a row of stakes was set. The area to the north and east of the stake fence was then partly filled up. During deconstruction, the ditch was later filled up with several deposits containing cultural material. The demi-lune was not nearly as deep as the main moat that defined the city's edge. Combined with an internal wall or bank (not seen), it might nonetheless have formed a formidable boundary. The finds from the fills consist primarily of slag, fragments of brick and tile, animal bones and sherds of ceramics (Baltic ware, Early Redware, German stonewares, Late Redware, and stove tiles). Some musket balls were also recovered; perhaps evidence of a violent altercation by the western gate.

It would appear that the 'island' of the demi-lune had a diameter of ca. 33 m, with the external diameter of the moat being about 53 – 55 m. In 1865, a semi-circular row of boulders was seen in this area and a plan sketch was made. With certain reservations for the accuracy of the plan, the row of boulders seems to follow the inner side of the semi-circular moat cut, suggesting that there could have been a stone revetment or wall on the inside of the moat. The upper fills of the demi-lune moat consisted of both re-deposited natural clay with little cultural material in it, and a larger number of layers with a high content of organic material and frequent finds. This suggests that the moat was backfilled with material dug up from natural deposits as well as material taken from areas where household waste, building materials and industrial waste had been dumped before. The content of peat in the deposits may suggest that this would have been a marshy or bog-like area – and that the some of the fills may have formed naturally over a longer period of time.

Samples of timber stakes (mainly of oak, one of pine) were taken for dendrochronology, but as the wood was badly preserved it was only possible to date a few of the stakes from the north-western part of the structure. This resulted in dates of A.D. 1525+/-7 and A.D. 1546+/-15, indicating that the stake structure was built in the first half of the 16th century. A sample taken from the base fill produced some seeds of *Chenopodium Sp*. (Goosefoot), one of which produced an AMS C14 date of cal A.D. 1440 – 1635. While this is a broad date range, it overlaps with the dendrochronology dates, and is further evidence that this ditch was in use in the early to mid 1500s, if not before.



There is a historical reference to money being spent in A.D. 1523 on 'skansen outside Vesterport'. Skansen translates as 'the redoubt', an enclosed defended area, often outside a larger defended area. This must refer to the area defined by this demi-lune. A written source from the 1520s mentions that men were paid to build an earthwork outside Vesterport, presumably the redoubt mentioned above. A reference in 1530 to the ramparts being enlarged greatly, and being much wider and higher suggests that the demi-lune's days were already numbered, with bigger defences being developed.

Figure 41 Plan of excavation from 1865 (Museum of Copenhagen)

In A.D. 1543 the roundel seems to have been rebuilt or extended, based on written records. However the nature of this work is not described in detail. – this may be when the demi-lune was filled in, and a new larger version built with an outer gate added.

The Outer Moat, Outer Gate and Bastion

By the late 1500s the demi-lune was filled in, and a new larger version built with an outer gate added. This formation is what seems to be depicted on the earliest map of Copenhagen from the 1590s (see Figure 36) The evidence for this enlarged outer moat as seen during excavations seems to suggest a more bastion-like arrangement however, similar to what is seen on the 1624 map of the city. It may be that in the intervening years the new larger demi-lune was reformed to be more angular, and turned into a by then more popular bastion-style defence.

The new outer moat is thought to have been constructed in c. A.D. 1550 or so, based on all available evidence. Ceramic finds recovered included early medieval (Baltic ware), though a large amount of high medieval pottery was also recovered (e.g. Late Greyware, stoneware), as well as some post-medieval pottery (Late Redware), raising the possibility of a late medieval construction date. However, the existence of the demi-lune (see above), which appears to date to after A.D. 1500 and must predate this outer moat, suggests that a 16th century date is likely. The outer moat was partially filled in as early as ca. A.D. 1600, to the east of the outer gate. This was due to ongoing changes to the defences in the time of Christian IV. The outer moat in front of the outer gate and to the west remained open until the latest moat was built in about A.D. 1670. It is fair to say, that from A.D. 1500 to A.D. 1670, there were almost constant changes being made to the fortifications in the Vesterport area. The construction cut for the outer moat was made into the glacial clay, and was steep sided, with a recorded depth of 4 m. It may have been deeper, but the base was never conclusively seen, due to the placement of the excavation area. Based on what was seen, we can suggest that it would have presented a formidable obstacle to enemy movement.

Figure 42 The outer moat as seen in Area 2B

Most of the moat's fills were dumped in, and may have comprised of the adjacent rampart, quickly backfilled in to the moat. This would explain the high clay content, which was quite different from the backfills of the inner moat which were far more organic and with a higher concentration of finds. The finds included a range of late medieval and early post-medieval finds, including cloth seals, a crossbow bolt, an iron arrowhead, roof tiles and window glass, copper and iron pins, stove tiles, a whetstone, a thimble, knives, glass beads, bone beads, horseshoes, a bone needle, bone handle, coins, shoe fragments, and ceramics (including Baltic Ware, Early Redware, Late Greyware, stoneware, Late Redware and Jydepotter). Many of these finds are the kinds of objects that might be lost in or near a moat, or on the rampart nearby.

A series of deposits and stone structures were seen to the immediate east of the gate, whose function seems to have been the revetment of the outer moat. These consisted of a series of large uncut boulders, in seven rough rows or courses, each a little 'behind' the row below, following the edge of the moat. It is assumed this was done both as a defensive reinforcement but also perhaps to prevent erosion of the moats edge. The revetment extended over a distance of ca. 7,5 m, in a dog-leg shape. It appears that the moat was only reinforced in this way close to the gate. Alternatively, the revetment elsewhere might have been removed when this area was filled in.

Figure 43 The upper course of the stone revetment, seen from the edge of the gate façade

The outer moat cut took a sharp turn some 16 m northeast of the outer gate, from running southwest-northeast to northwest-southeast. This shows that the new outer moat did not link up with the inner moat, but instead ran approximately parallel with it. The 16th century fortification modifications effectively pushed the city moat out to the southwest. For a time the inner moat was still open, before being converted into a millrace. This is supported by map evidence form the early 17th century, particularly the Swedish spy map of 1624 (see Figure 46). The angled turn in the moat is indicative of the angled bastions which became popular in the late 16th and 17th centuries.

A series of moat fills were seen in front of the outer gate façade in Area 5, the lowest of which was a rubble deposit which could have been used in the construction of the gate façade. Other fills varied from sand, to silt, to peat, and generally it is thought that these deposits built up during the moats usage period. One deposit was made up of deliberately placed rectangular peat or turf sods. Possibly the aim was to conceal the base of the gate and the bridge pillars, or it may have related to consolidating a new phase of landscaping, to prevent it from eroding. Finds included Late Redware sherds, roof slates, nails, shoe fragments and a small fragment of a sandstone statue in the form of two life-size human fingers that appeared to be holding a book. It is possible that this was a small element of a statue that stood on the front of the gate, which we know from historical sources was decorated and embellished.

Figure 44 Landscaping evident in clay placed next to the corner of the outer gate façade

The Outer Gate

The outer gate, thought to have been first constructed in the mid or late 1500s, was seen in Areas 2A and 5. It is difficult to date precisely based on the archaeological evidence, with few finds directly associated with it, no timbers that could be dated, or suitable material for C14 dating. It overlay and post-dated the demi-lune however (ca. 1500-1530s, see above), and was depicted on the earliest map of the city from the 1590s. Hence it was probably constructed between c. A.D. 1530 and 1590. As mentioned earlier, in A.D. 1543 the roundel or demi-lune seems to have been rebuilt or extended, based on written records. This could also suggest a possible date for the construction of the outer gate. In A.D. 1583 Christopher Valkendorff, King Frederik II's "rentemester" (treasurer) according to the written sources established "a vault in Vesterport between the two gates ...". This reference appears to show that by A.D. 1583 at the latest, there was an outer gate in place.

The outer gates consisted of two main elements, the façade and the foundations of the sidewalls (no rear wall was seen, due to modern truncation). The sidewall foundations consisted of two parallel structures, constructed of very large uncut boulders.

Figure 45 The remains of the foundations of the outer gate side walls, as seen facing southeast

The boulders were placed carefully along the edges of the construction cuts, like kerb stones, and up to four courses of these were preserved. In a few instances smaller wedge stones were documented under or between the larger kerb stones. Traces of mortar and red brick dust were noted on several of the stones, indicating reuse. The western foundation measured 10,4 m x 3,1 m, while the eastern foundation measured 10,6 x 3,5 m. The preserved depth of the foundations was 1,6 m. The dimensions were however heavily affected by modern truncations. The gap between the two foundations was 2,75 m. Between the foundation stones were layers of both very organic and clayey soil, which would have served as bonding material within the foundations (mortar was not used).

The outer western gate building was partly documented in 1865 when the large Schacks Bastion overlying the structure was demolished and hence this gate was exposed (see Figure 41). It was partly excavated again in connection with rearrangement of Rådhuspladsen and the construction of air raid shelters in 1931 and 1944. In 1865, the structure seems to have been preserved to a maximum height of approximately 3,5 m, including boulder built walls on top of the foundations and a paved surface between the eastern and western walls.

During the excavations in 2011-2012, nothing was left of the structure above former ground level. The interpretation as a gate foundation was initially based on written sources and maps (earliest map of Copenhagen ca. A.D. 1590 and the Swedish "spy map" from A.D. 1624, see Figures 36 and 46). The interpretation seems certain, based on the size, character and location as well as orientation of the structure.

Figure 46 Detail of the western gate area from the Swedish Spy Map of 1624

The exact dating of the construction of this gate is not clear, as the dateable finds are both medieval (bone combs, medieval pottery) and post-medieval in date. The youngest finds located between the foundation stones are Late Redware, stoneware and a single Jydepot sherd, which indicate a first deposition date between 1550 and 1650 AD. Therefore the date of the construction of the foundations is likely to be late 16th or early 17th century. Based on historical information, it is likely to have been constructed sometime between 1530 and 1590, and was used until no later than c.1670 – but possibly only up to 1624 when the Swedish spy map could be depicting a different gate (see above). It is unclear if the façade was built at the same time as the side walls, it is possible that the façade seen during excavation was a later addition (see below). The upper level of this structure where the large foundation became a wall, was no longer extant, but were seen in the 1931 excavation, when it was described as having been of stone and brick.

The outer gate façade

The main façade and outward facing wall of the outer gate was constructed of stone and brick. The lowest part was set in a construction cut that was dug to about the same level as the moat cut, and had a depth below contemporary ground level of at least 4 m. The bottom section was faced entirely of cut stone, up to a height of about 3 m. These were very substantial stones, rounded at the back, but with flat squared fronts, and lay in five courses (only three survived at the western end). Behind these were more randomly shaped stones as well as brickwork, and the entire structure was bonded together with mortar which was still extremely solid during excavation. The construction cut for the façade stepped upwards to the rear (north-northwest), meaning that the wall was deepest at the front. Underneath the cut-stone base, a single course of un-bonded irregular rocks had been placed as the primary foundation layer for the structure; these were lodged in clay, which was probably placed deliberately for this purpose.

On top of the cut stone section of the wall a brick superstructure was built. This survived up to a height of 2,25 m, and though badly truncated, it survived well enough to see where and at what height the opening of the gateway was. Thus it could be seen that the road through the gateway had been at a height of ca. 4,3 m above the base of the wall foundation, and had an internal width of between 6 m and 7 m. The gate façade had overall external dimensions across the front of 11,9 m, and a width from front to back of 4,4 m. Taking into account the deepest layer of foundation and the buttress additions to the eastern end, then the dimensions increase up to 13,3 m in length across the front, and 5,1 m in width.

Figure 47 The outer gate façade

The foundation cut for the outer gate façade was separate from the construction cut for the side walls of the gate building. This suggests that they may not have been built at the same time, and indeed it is believed that the outer gate was renovated and given a new front during the reign of Christian IV. This suggests that the gateway was built between c. A.D. 1530 and A.D. 1590, with the façade being rebuilt around A.D. 1618/19. A series of white limestone blocks used as part of the side foundation of the western corner of the gate may have been part of the original gate façade, though this is speculative.

It is clear in plan that the façade and the side walls of the gate structure were not at right angles to each other, which again may suggest that the façade was not original, but instead added to a pre-existing structure, whose original front may have been at a more conventional angle to the rest of the structure. The results of an excavation here in 1931 suggested that the gate façade was placed on the outside of an earlier façade and it was thought that the changes might have been related to Christian IV's redecoration of the gate house beginning in A.D. 1618-19, described in written sources.

The façade was an extremely durable structure, with an internal structure of criss-crossed brick courses and stone which would probably have made it capable of withstanding serious bombardments.

At some point following the construction of the main façade, additions were made to its eastern end. These took the form of brick built buttresses or supports. Why they were built is unclear – perhaps they were deemed structurally necessary, or alternatively they formed the base for some form of cosmetic addition to the structure.

On the spy map of 1624, the gate depicted does not appear to be in the same position as this outer gate. In fact the bridge and gate on this map do not appear to correspond very well with anything seen archaeologically at Rådhuspladsen. On the other hand, a dam and bastion shown are likely to be those that were identified during excavation (see below). Whether the illustrator of the map made errors in this area, or there once was another gate, is uncertain.

Figure 48 Close up of the outer gate façade (left)

In fact the physical evidence seen during the Rådhuspladsen excavation was more similar to what was depicted at Nørreport in A.D. 1624 (see Figure 50). Again this can mean an error by the illustrator (Heinrich Thome, engineer), or alternatively that the outer Vesterport had at one time looked like what was drawn at Nørreport.

If we trust the map, it could suggest that the outer gate was taken out of use by A.D. 1624, with a new gate built closer to Frederiksberggade. In fact the gate shown on this map seems to directly overlie the medieval moat (by then a mill-race), which raises the possibility that the mill also acted as a gatehouse. Unfortunately, the picture is somewhat unclear.

Figure 49 The façade seen from the side (note how it projects beyond the side wall on the near side)

Figure 50 Nørreport as depicted on the Spy Map (1624)

The Bastion

Historical sources suggest that in A.D. 1618-19 changes were made to the outer gate area. In the process of rebuilding the fortification based on Dutch and Italian models, the rounded island was transformed into a sharp-edged bastion, physically connected to the rampart in the semi-circular fortification. The bastion was known as Vesterport's bastion. Traces of the bastion were scarce during the excavation, but to the west of the outer gate some evidence was seen. This consisted of a section of cut stone wall that projected out from the west corner of the gate façade at an angle, and slightly further west – on the other side of a deep modern truncation – a substantial piece of walling built up against the natural clay subsoil (to its north), with the moat backfills to its south. The stone facing had mostly been removed, leaving mortar and bricks behind (see Figure 51), but it was clear from the very large stone sockets that there had been a stone outer face to the structure originally, up to a height of at least 3 m, and from there up it had been brick faced.

Figure 51 The robbed-out face of the bastion

This was very similar to the facing of the outer gate itself, the main difference being that the gate had a vertical face, while this wall had been built leaning slightly backwards against the boulder clay behind. This suggests that the structures were built at the same time. The fact that the stone facing of the outer gate was not removed as was the case with the bastion wall, may suggest that the structures went out of use at different times, with a different approach taken to decommissioning them. This wall was clearly a surviving element of the late 16th/early 17th century bastion wall. The reason for the removal of the cut-stone facing of this wall is likely to have been its re-use in another structure, probably the late 17th century bastion.

This section of bastion wall measured c. 23,5 m in length. Part of it was interpreted as a dam when it was first seen on site (the outer, western section), but this is now considered unlikely. The Spy Map of 1624 depicts a dam projecting off of the western end of the bastion's southern side, but this was probably located further west, outside of the excavation area.

Infrastructure

The 16th century saw a further rebuild of the bridge over the moat, and the construction of a sluice that fed water into the moat just north of the bridge by vesterport. Some wooden waterpipes were also seen.

The Third Bridge

The final bridge over the medieval moat outside the original (inner) Vesterport consisted of a brick-built bridge resting on masonry stone foundations. Dendrochronological evidence from associated timbers suggests strongly that this bridge was constructed in about A.D. 1500. It measured about 17 m in length, and 7 m in width.

Figure 52 The brick and stone bridge seen from the east

This third and final bridge was documented in a number of parts. The bridge was located in Area 4, and spanned the moat in a southwest-northeast direction. It was a replacement of the earlier high medieval bridge and was built reusing its foundations. Consequently, the dimensions of the central channel were already defined by these earlier foundations. The main elements of the bridge consisted of a number of structures and associated cuts, separated by the central channel. On the western side a northwest to southeast orientated wall was keyed into a northeast to southwest aligned wall. No joint was visible between these two walls suggesting a contemporary construction. Another wall (removed by the bunker) was recorded during

the 1940's excavations, which would have created a three-sided structure. This construction can therefore be seen as a large three-sided rectangular structure measuring approximately 5,5 m X 7,5 m.

On the eastern side of the moat a similar structure existed as on the western side, except on the fourth un-walled side, where the medieval gate would have formed the north-eastern extent. Again, not all of this side of the bridge survived, with the southern side having been robbed out at some point in the past.
The base or ends of a brick arch were seen on both sides of the bridge, and were clearly built at the same time as the main bridge walls. The top of the arch had been deconstructed and removed in the past, possibly when the final defences were constructed in A.D. 1670.

Brick buttresses or bridge supports were added to the side of the bridge at some point, in order to support the main structure. Two of these survived, one on either side of the bridge. They were 0,8 m in width, and projected 1,7 m out from the bridge.

Figure 53 The western side of the bridge arch, with foundation boulders visible and timber uprights

The bridge was quite similar to that documented at Nørreport in 1915, along with the (presumed) medieval gateway. A reconstruction drawing made by C Christensen based on what was seen in 1915, suggests that the bridge seen by Nørreport was constructed in a very similar way to the one described above, including boulder foundations and timber uprights lining the channel under the arch. There is a high probability that these two bridges were constructed at about the same time.

Some timber structures were noted in the environs of the bridge walls which are likely to have acted as scaffolding or construction-phase related structures. One of these was located on the western edge of the moat, immediately west of the masonry bridge. It consisted of three slightly angled timber uprights in a row, running parallel to the moat and bridge, and one horizontal beam, which had probably been attached to the uprights. It appears that these were also part of scaffolding erected during the construction of the masonry bridge. This is also based on the fact that another double row of posts was uncovered on the inside of the bridge arch, pressed up against the inner faces of the arch base. These were of a similar age to those on the western edge of the moat, and were also thought to be construction scaffolding.

The timbers on the edge of the moat were well enough preserved that a dendrochronology date could be obtained from one upright and a horizontal beam (both of oak). The upright returned a date of A.D. 1498 (+/-14), while the horizontal beam returned a date of A.D. 1480 (+/- 20). This points to a construction date for the scaffolding and bridge of c. A.D. 1500. Further probable scaffolding timbers were located in the middle of the moat, at a depth of c. 4 m below street level. These composed of a number of upright stakes and a single plank aligned along the central channel of the moat. A number of dendrochronological samples were taken, of which two produced early felling dates of A.D. 1442 and 1460, but the remaining four produced dates clustered around A.D. 1495 to 1500, again suggesting a construction date of very close to A.D. 1500. The older pieces may have been reused.

Under the arch of the bridge, a further structure consisted of a number of timbers, aligned roughly northwest to southeast, in varying degrees of structural coherence. The east and west sides were divided by a laterally laid plank. One silt deposit had built up over the timbers. The dating of this structure is based on three dendrochronology dates, and points to a date between about A.D. 1555 and 1571. The function of the structure is unclear, but taking its dating into account, it may be that it was associated with work carried out on the bridge arch, perhaps some repairs carried out in the mid to late 1500s.

Dating of the brick bridge is based on the dendrochronology dating of the various associated timber structures, (seven samples returned dates) in which case a construction date of c. A.D. 1500 seems likely. The brick types used were not be at odds with this dating. This bridge appears to have been in use for over a century, but sometime after the mill was constructed in the early 1600s, it ceased to be used for access to the city. It may have continued in use (with or without an arch) in connection with the mill until c. A.D. 1670, by which time the mill too went out of use. In this final phase of its usage, the bridge housed the final stretch of the mill headrace, and additional structures including a dam were built within the bridge arch. It is possible that the location of the bridge influenced the choice of location for the mill.

This then was the third and final phase of bridge across the inner moat. The first phase was built in c. A.D. 1372, the second in c. A.D. 1443, and this phase in c.AD 1500. This would suggest that the first two bridges (most likely of timber, and timber and masonry respectively) lasted about 70 years and c. 55 years respectively, and this version at least a century. The reason for improving the bridge in c. A.D. 1500 could have been a need for structural improvements, i.e. to make a stronger bridge. However it is also possible that it may have been rebuilt for purely aesthetic reasons, as an arched brick bridge may have been considered more impressive at the city's western entrance.

The timber-lined sluice and gateway

Located 11 m northwest of the bridge by the west edge of the medieval/early post-medieval moat, a sluice or water-channel was seen. The main sluice structure measured ca. 8 m in length (as exposed) and ran in a southwest-northeast direction. As well as the sluice, a brick wall and gate were also seen, which served to control the flow of water into the moat from the sluice. This consisted of a brick-built wall (1,8 m high, 2,2 m long and 0,5 m wide) of munkesten type bricks (large generally medieval form) running along the inside of the moats edge and a timber framed 'doorway' that must have had a closing mechanism. A series of silted deposits were documented within the sluice.

Figure 54 The sluice wall, gate and revetment seen from southeast

The timbers were of oak and pine. Dendrochronology dates retrieved suggest that the sluice and gate date to ca. A.D. 1537, with repairs going on until about A.D. 1560. Finds retrieved included sherds of Late Redware, a stylus and a roof tile. This structure dates to roughly the same time as the demi-lune described above, and its base was at a very similar height above sea level. It may be that the 'sluice' was in fact connected to the demi-lune moat. This moat was much shallower than the main city moat, and so it stands to reason that without some kind of control the water would simply flow down into the main moat, and the demi-lune moat would dry out. Consequently the sluice may represent a control point, regulating the water level in the demi-lune moat. As the area between these features was not excavated, it was not possible to confirm this theory.

The Outer Bridge

With an outer gate and moat constructed sometime between A.D. 1543 and 1583, an outer bridge was also necessary from that time. Various bridge elements were seen in this area; one element comprised of a free-standing brick pillar. This was slightly out of alignment with the entrance to the outer gate. Such an angle in alignment may have been intentional and could have acted as a defensive measure to slow down an attack or charge on the outer gate.

Figure 55 Bridge pillar seen from southeast

This pier or pillar measured 5 m in length, but was truncated at its eastern end, so it was longer originally. It measured 1,25 m in width, and survived 17 brick courses in height (ca. 1,6 m). It was placed upon a foundation of limestone blocks. The top of this structure was found at a depth of c. 2 m above sea level, or > 3 m below present ground level. Hence, the moat base in this area was at least 5 m below ground level. Moat fills were noted around this structure, and seemed to have built up in situ after its placement.

Possible evidence for a second pillar was seen c. 4 m to the southeast, in the form of brick rubble. Evidence for this outer bridge was also found directly adjacent to the façade of the outer gate in Area 5, in the form of two brick pillars and their associated foundations and construction cuts.

Figure 56 Bridge pillars seen from west

These pillars were built directly up against the gate façade, though not keyed in. The eastern pillar survived to a height of 2,7 m, and sat on foundations c. 0,85 m in depth. The western pillar had been almost completely removed, and survived to a height of 0,3 m with only a few courses of brickwork remaining. It sat on a foundation 0,65 m deep. In both foundations, cut granite stones very similar to those used to build the outer gates foundation were used (though less formally laid). The pillars were built at a slight angle to the gate façade, and projected 1,28 m (eastern pillar) and 0,6 m (western pillar) from the façade.

Wooden waterpipes

Two wooden waterpipes were identified in Area 1, running in a northwest-southeast direction for a distance of 15,6 m (as seen). Each was found in a linear trench, cut through archaeological layers and the underlying natural geology. Each had a diameter of c. 0,3 m. Dendrochronology revealed one to be a very early example, the pine tree having been felled in A.D. 1589/90. This makes it the oldest dated pipe from the excavation at Rådhuspladsen.

The second pipe appears to be one of those detailed on a map from A.D. 1757. On that map of waterpipe placement, several pipes are shown in this area, suggesting it was a major entry point into the city for water. No date was retrieved, but based on its proximity to the example above, and given that they ran parallel to one another, it may date from a similar time.

Other Features

Ditch

A linear ditch was excavated in Area 2B running parallel to, and inside the 16th century moat that ran southwest–northeast across this trench. While its backfills contained 17th century material, it is considered likely that the ditch itself is 16th century in date. Unfortunately as it was seen in a confined area, no evidence was found to further explain its function.

Surfaces

A number of deposits were seen c. 6 m west of the medieval gateway which have been interpreted as representing a work surface and associated cultural accumulation built up in situ. One of these layers contained charred seeds which could relate to cereal drying. The dating of these layers is based mainly on ceramics, which point to a late medieval date. The layers above contained post-medieval ceramics. This suggests a working surface laid down towards the end of the medieval period, and continuing in use into the post-medieval period (after A.D. 1500).

These layers occurred just west of the medieval gate, in an area that was just inside the moat. This suggests that this area was located just between the medieval moat and embankment, as it cannot have been inside the embankment. This suggests that a narrow area existed outside the medieval rampart, but inside the moat, a sort of liminal space or no-mans-land, neither in the city nor fully outside the city. The cultural build up layers suggest it was a working surface of some kind. The presence of a possible iron-working feature deeper down, of likely medieval date, is also interesting, suggesting that this kind of work might be carried out near to, but outside of the gate, yet not outside the city territory entirely.